



# Eyre Peninsula Coastal Action Plan and Conservation Priority Study

## VOLUME 3



Australian Government



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of South Australia



# Eyre Peninsula Coastal Action Plan and Conservation Priority Study

A 2019 review of 2011 lower conservation priority coastal cells

## VOLUME 3

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This plan, funded by the Eyre Peninsula Landscape Board, is a coastal conservation assessment and coastal action plan for the Eyre Peninsula coast from Two Hummocks Point in Spencer Gulf to the eastern boundary of Wahgunyah Conservation Park. This work builds upon the Conservation Assessment of the Northern and Yorke Coast, the Southern Fleurieu Coastal Action Plan and Conservation Priority Study, the Far West Coastal Action Plan and Conservation Priority Study and Metropolitan Adelaide and Northern Coastal Action Plan.

### This publication may be cited as:

Caton, B., Pelton, N., Turner, A., Detmar, S., Fotheringham, D., Laurence, S., Quinn, J., Royal, M., Rubbo, N. and Sandercock, R. *Eyre Peninsula Coastal Action Plan and Conservation Priority Study, Volume 3 – A 2019 review of 2011 lower conservation priority coastal cells*, Eyre Peninsula Landscape Board and Department for Environment and Water, Adelaide. Unpublished.

### Cover photos

Front cover (clockwise from top left): Western whipbird *Psophodes nigrogularis*, M Pickett; Bight Coast Skink *Pseudemonia baudini* Tony Robinson; Loch Well Beach. Calcarenite coastal plateau, first order valleys, beach and nearshore bars, Coast Protection Board 2018; Bead Glasswort *Tecticornia flabelliformis*, A Turner; Port Lincoln Wattle *Acacia anceps*, R Sandercock.



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## **Acknowledgements**

This project and the previous Coastal Action Plan and Conservation Priority Study on which it is based, has received contributions and help from many different sources.

This current review was made possible through funding from the Eyre Peninsula Landscape Board. Thanks must go to the following people from the EP Landscape Board, Department for Environment and Water and community members across the region who have provided additional information for the report such as identifying ongoing and increased conservation threats including providing updated weed and pest animal data and mapping. Many of these individuals and relevant experts have been kind enough to give time to assist the project, validate and provide data or information into the cell descriptions, revise lists and /or comment on drafts which improved the outcome of the report including Andrew Freeman who has driven and supported this project from beginning to end, Tim Breuer, Barb Murphy, Shelley Paull, Corey Yeates, Rachael Kannussaar, Geraldine Turner, Michael Freak, Sam Everingham, Dirk Holman, Ian Quinn, Pat Walsh, Robert Sleep, Tamahina Cox and Andrew Sleep.

However, there are numerous people involved in caring for the coast, who have been kind enough to give time to discuss this project, discuss issues in the field and/or provide input into the report and previous volumes of this study. The countless hours spent caring for the coast cannot be measured or acknowledged enough.

### **First Nation Acknowledgement**

The Eyre Peninsula Landscape Board acknowledges Aboriginal people as the First Peoples and Nations of the lands and waters we live and work upon and we pay our respects to their Elders past, present and emerging. We acknowledge and respect the deep spiritual connection and relationship that Aboriginal and Torres Strait Islander people have to Country. The EP Landscape Board works in partnership with the First Peoples of South Australia and supports their Nations to take a leading role in caring for their Country.



# Introduction

The purpose of this study is to understand and facilitate the conservation, protection and management principles of the coastal resources of the Eyre Peninsula (EP) Landscape Board region<sup>1</sup>, and to establish conservation priorities for places and areas within the region. The study aims to provide a rational basis for conservation priority actions and places within the defined coastal region; it suggests actions to address threatening processes at specific locations within the region. The study also establishes a coastal database in map and table form, as a tool for ongoing adaptive management.

When the initial Eyre Peninsula Coastal Action Plan (EPCAP) study was undertaken in 2011, it was not possible to provide a detailed description for all 85 cells within the region, where only 56 of the cells were written up in detail. These consisted of: all cells identified as having high conservation priority status; all cells with medium conservation and high threat, and; all cells with medium conservation, a medium or low threat, which had a conservation value over 100.

In 2019 the EP Landscape Board funded a review of the EPCAP to be carried out by DEW to ensure that the remaining 29 cells omitted from the initial report now have actions to address threatening processes at specific locations within the region.

The EPCAP studies are divided into three volumes:

**Volume 1** of the report includes the rationale for the study, the data on which it is based, the detailed methodology of valuing the data and presenting it within digital maps, regional overviews of conservation values and threats and regional management proposals.

**Volume 2** presents the results of the 2011 GIS study for the region including the GIS results for each coastal sub-region, or ‘cell’, the results of field and desk based investigation, as well as consultation with key players. A major part of the 2011 study presented in Volume 2 included descriptions of 56 of the 85 cells written up in detail along with local management actions to reduce threats being recommended, and prioritised (within the region) from the conservation and threat analyses. Thus description, conservation values, threats and actions are brought together at the local level, but within a regional context. It is hoped this will assist individuals, groups and organisations working on sustainable management of coastal areas at the local scale.

Where local conservation values and threats identified a wider regional issue and appropriate action, these have been detailed in the Regional Management Proposals section of the report presented in Volume 1.

**Volume 3** presents the 2019 review of the 29 cells identified as having a conservation priority value below 100 that were not included as part of the 2011 study. As a result of this review, all 85 cells within the EP Landscape Board now have actions to address threats at specific locations within the region. Local management actions are included in the detailed cell descriptions in the following Volume 3 report.

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<sup>1</sup> Wahgunyah Conservation Park has not been included in the study area although it falls within the Eyre Peninsula Natural Resources Management Region; Wahgunyah Conservation Park was included within the Far West Coastal Action Plan and Conservation Priority Study

Furthermore, the 2019 review highlighted that 8 out of 29 of the cells under review would likely have been elevated to a higher conservation priority status, due to more recent survey records that have recorded an increase in flora or fauna species richness or an increase in the number of threatened species, as an example. These included cells EP3 False Bay, EP5 Eight Mile Creek, EP12 Mills Beach, EP17 Port Neill, EP18 Cape Hardy, EP72 Smoky Bay, EP74 Thevenard/Ceduna and EP80 Point Sinclair. However, it should be emphasised that while some cells as a whole remain in a lower conservation priority category, they often contain areas of high conservation significance within the cell worthy of investment to protect native flora and fauna species and vegetation communities they contain from threats. In some cases their lower conservation priority status may be due to an inadequacy of survey records on biodiversity and habitat values. This may certainly be the case for some cells where expert reports exist for pest flora and fauna and threatened species that are not represented in online survey data layers. In this regard, proposed actions suggest undertaking coastal flora and fauna surveys to further inform future management directions.

**Note:** The terms 'highest', 'medium' or 'lowest' for conservation value and threat total are comparative terms for the region only. They do not imply high or low value within the state or nationally. Thus a cell summarised as lowest value within the Eyre Peninsula coastal zone might, for example, be high value within the Southern Fleurieu region. However, the three categories allocated to cells, based on current available information, inform and prioritise management decisions and actions. Additional information can easily be added as it becomes available, and values and priorities may change in some areas.

The final reports for Volume 1 and 2 for the project are in hard copy and electronic copy while Volume 3 is presented as an electronic document. A DVD produced for Volume 1 and 2 reports as part of the 2011 study also includes all the digital maps and data layers as well as cells presented in Volume 3, including additional information such as species lists.

## Cell Descriptions – EP 1 Douglas Point

### Cell EP 1 Douglas Point

Cell area 1121.11 ha. Shoreline length 26.4 km.



#### Landforms

An undulating coastal plain with headlands, platforms, and low bluffs alternating with small embayments. Low slopes in Mesoproterozoic Gawler Craton volcanics back the shore, gently dissected by short first and second order streams. The embayments show small amounts of Holocene sand storage in shallow sub-tidal flats over rock, small high-tide beaches and, in places, small dunes. The beaches are narrow, low energy, reflective, sand and cobble shores, with platforms and some sand flats in front. In the south of the cell the shoreline becomes rockier, with a very narrow strip of high tide sand and some backing shingle ridges. At the northern end of the cell, mangroves colonise low tide mudflats, fronting a high tide narrow beach; the mudflats appear to have been constructed by sporadic flow down a dry creek.

#### Benthic Habitat

Patchy sparse seagrass at the northern end of the cell, gradually

increasing southward; dense near Backy Point.

#### Biota

96% of the cell is remnant vegetation covering an area of 1080 ha. There are 13 opportune flora survey sites, 17 Herbarium flora record sites and nine opportune fauna survey sites within this cell. *Maireana sedifolia* mid sparse shrubland over *Enchylaena tomentosa* var. *tomentosa*, *Rhagodia spinescens*, *Austrostipa* sp. shrubs dominate the coastal slopes. Smaller areas of tall *Acacia ligulata*/*Olearia axillata* shrubland are found on the small dune areas.

#### Land Use/Land Ownership

Traditional lands of the Barngarla people.

Small community of shacks located at Backy Bay, Douglas Point South, Douglas Bay and Douglas Point.

22% is unalienated Crown land. This forms a substantial coastal reserve from Douglas Point to Backy Point.

Access to the coastal area north of the Douglas Point campsite is prohibited by Federal Defence.



## Cell Descriptions – EP 1 Douglas Point

There is an informal unmanaged campground near the Commonwealth Department of Defence boundary.



**FIGURE 6.58 Douglas Point and surrounds. Undulating coastal plain with headlands, platforms, and low bluffs alternating with small embayments. Photo: Coast Protection Board, 2018**

### *Uses (Field visits and local reports)*

Conservation - (Blanche Harbour-Douglas Bank Aquatic Reserve has been replaced by Blanche Harbour Sanctuary Zone (Upper Spencer Gulf Marine Park managed by Northern & Yorke Landscape Board).

Commercial Fishing - Prawns, marine scale fish, charter fishing – Whyalla Fishing Charters  
Aquaculture – Finfish, yellow tail kingfish, snapper.

Recreation and tourism – Shacks, sightseeing, nature, hiking, ecotourism (e.g. Whyalla Diving Charters), swimming, snorkelling, fishing, cockling, camping (informal), dog walking, diving, ORV use (four wheel drives, motorbikes, mountain biking), boating.

Boat launching – Beach launching.

Industry – Natural gas (submerged gas pipeline from Douglas Point South to the other side of the Gulf).

Defence –Department of Defence (Australia) Cultana Training Area.

### *Values (Field visits and local reports)*

Important habitat for threatened fauna, including shorebirds. Seagrass, mangroves and saltmarsh provide important nursery habitat for fish, including several commercial and recreational fish and crustacean species caught locally in upper Spencer Gulf and southern Spencer Gulf.

There are a large number of species that are found nowhere else in South Australia, and/or more likely found in tropical or sub-tropical areas of Australia.

Sponge/ascidian garden – located approximately 500m offshore.

## Cell Descriptions – EP 1 Douglas Point

Backy Point is a part of the Gawler Range Volcanics, a Site of Special Geological Significance. Barngarla Culture – Weeroona Bay Significant Area.

### Threats (Field visits and local reports)

Proximity to aquaculture - interference with coastal processes, increased nutrient loads, seagrass loss due to shading, damage to intertidal zone, marine debris.

Pollution - Rubbish dumping, garden waste dumping, marine debris, informal camping toilet waste.

Dune erosion - Caused by vegetation destruction, ORV use.

Access issues - uncontrolled vehicular access, uncontrolled camping, track creation, disturbance of shorebirds, dune vegetation destruction, firewood collection.

Feral animals – Cats, foxes, goats.

Weed infestation - Garden escapees, green waste dumping.

Future development - Industrial expansion, aquaculture.

### Opportunities (Field visits and local reports)

Opportunities for EP Landscape Board to collaborate with Whyalla City Council and Cultana Jenkins Shack Owners Association regarding a sheltered picnic area on Douglas Point South Hill with interpretative signage; to protect shingle beach geological feature and to support Clean-up Australia Day clean-ups held by the Cultana Jenkins Shackowners Association.

A management plan should be pursued, with particular emphasis on revegetation, pest plant control and access management. Implementation of the plan should involve Cultana Jenkins Shackowners Association, Whyalla Council, and EP Landscape Board.

Collaboration between parties (eg. EP Landscape Board, Whyalla City Council) on work associated with Northern Coastline Master Plan.

Collaboration and partnerships (eg. EP Landscape Board, Regional Development Australia). Potential on-ground projects include formalising campsites and rationalisation of tracks, and improved Barngarla Culture educational and interpretation experiences.

### Conservation Analysis (GIS)

The total of conservation means of all conservation layers scored moderate to low for the region in the 2011 analysis was 97.44. The map of summarised detailed conservation scores shows low to low/ medium scores throughout the cell; only tiny dune areas backing pocket beaches record even moderate scores. Some individual layers show above average totals. These include vegetation metrics (blocks size, shape and connectivity), butterfly habitat (coastal slopes shrubland) and geological heritage (Backy Point is a Site of Special Geological Significance). Scores for threatened status, biodiversity and habitat are low: the semi-arid chenopod shrubland of the coastal slopes do not rate highly in this assessment.

The 2019 data showed an increase of ten additional flora species that were recorded in addition to the 2011 data including one additional weed record, bringing the total number of species from 20 records in 2011 to 30 records in 2019. One of the new fauna species records included the Greater Crested Tern, *Thalassens bergii*, listed as migratory under the *Environment Protection and Biodiversity Conservation Act 1999*. It is unlikely that the limited, additional information since 2011 would have changed the conservation rating of the cell.

### Threat Analysis (GIS)

The 2011 analysis allocated this cell a score of 45.78 which is a moderate sum of threat means for the region. The distribution of these scores shows the highest totals on the slopes at the back of the cell, notably at Backy Point, and both north and south of Point Douglas. For the rest,

## Cell Descriptions – EP 1 Douglas Point

moderate to high threat totals prevail; low threat totals are found only in the far north of the cell in the intertidal lands and low-lying areas.

The components of the threat total are clear: off road vehicles; land ownership and land use; viewshed and viewscape. Off road vehicle activity is a potential threat to the Site of Special Geological Significance at Backy Point.

It is likely that the area impacted by ORV and campsites has increased since 2011 and there was one additional weed species recorded. However, it is unlikely that these would have increased the overall score sufficiently to increase the threat rating to high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Beach recession and dune instability due to foredune damage within the numerous pocket beaches. Increase in dune mobility; Tidal flooding of saltmarsh in the north of the cell becomes more frequent and of greater duration, leading to samphire community change, and possible mangrove and samphire migration.	Active management of dunes to slow recession and consider possible retreat buffer zones to allow for transgressive movement of sand in response to sea level rise; Establish a saltmarsh profile to monitor for saltmarsh change; Consider possible retreat buffer zones for tide-dependant ecosystems.	
2070: +c.80cm	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore; Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
<b>Storms:</b> <i>Frequency</i> continues to show great	2030: Occasional storm tide flooding above highest known tides;	Continue to monitor shoreline movement and saltmarsh boundaries in order to manage adaptively;	



## Cell Descriptions – EP 1 Douglas Point

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
variation on a decadal scale; <i>Intensity</i> of large storms increases	Damage to foredunes.	Active management of dunes.	
<b>Warmer average conditions:</b> 2030:+0.3 to 0.6°C 2070:+1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses; Chenopod shrubs on the coastal slopes likely to adapt well to increasing aridity.	Active dune management, including weed control.	Ensure coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Dry creek beds on the coastal slopes are mobilised by these rare events, bringing sediment to coastal saltmarsh and nearshore areas.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure with local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor groundwater levels.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Low energy persistent swell wave climate maintains slow sediment movement regime.		

## Cell Descriptions – EP 1 Douglas Point

**TABLE 6.54 Recommended Actions and Priorities for EP1 Douglas Point**

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
Whole cell	Ongoing and accelerating sea level rise beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board
	There is a high level of ORV activity throughout this cell, in particular between Douglas Point and Point Lowly, evidenced by multiple tracks and informal car parking.	Develop access management plan, including review of existing access with a view to rationalise unnecessary tracks and car parks; Block access (e.g. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain;  Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion;  Install directional/ educational signage;  Maintenance of previous access management works;  Community education.	High (cons/threat)	DEW, Whyalla City Council, EP Landscape Board, DPTI, community, Tourism SA

## Cell Descriptions – EP 1 Douglas Point

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping, particularly between Fitzgerald Bay to Point Lowly, with potential impact from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, dune instability, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping; Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage & maintain (e.g. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed.	Medium (cons/threat)	DEW, EP Landscape Board, Whyalla City Council, community, Tourism SA, private land owners
	Tide-dependant mangrove and saltmarsh need space to retreat with sea level rise.	Monitor saltmarsh change through the establishment of a profile survey line; Investigate opportunities to modify land use and development plans to create buffer zone for saltmarsh retreat (in accordance with EP regional plans).	Medium (local saltmarsh habitat values are low);  Medium (cons/threat)	DEW, EP Landscape Board, Whyalla City Council
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, Whyalla City Council
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, landowners, community groups, Whyalla City Council, EP Landscape Board, DEW, DPC

## Cell Descriptions – EP 1 Douglas Point

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes	Increasing vulnerability to large storm surges as sea level rises; More arid conditions slows recovery from damage.	Monitor beach recession and dune instability; Weed control; Blow out restoration.	Medium (cons)	DEW, EP Landscape Board
Beaches	Vehicles on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/rationalise locations, monitoring impacts, consistent speed limits, rules and signage; Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach/temporary fencing/dog free or dog on leash areas; Undertake and/or support ongoing shorebird monitoring programs; Raising community awareness through interpretive signage and other programs.	Medium (cons/threat)	Whyalla City Council, EP Landscape Board, DEW, PIRSA, DPC Planning, Tourism SA, Birds Australia, community
Backy Point	Site of Special Geological Significance threatened by lack of public awareness and ORV activity.	Provide educational material/signage; Monitor ORV activity	Medium (cons/threat)	EP Landscape Board, Whyalla, City Council, community

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	1080.24 ha (96.35% of the cell)
<b># flora surveys / records</b>	13 (0*) opportune and 17 (1*) Herbarium record sites
<b># flora in cell</b>	30 (20*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	1 (3*)

## Cell Descriptions – EP 1 Douglas Point

<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	10.52% of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Medicago minima</i>	Little Medic		1

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Alectryon oleifolius ssp. canescens</i>	Bullock Bush		
<i>Angianthus brachypappus</i>	Spreading Angianthus		
<i>Atriplex vesicaria ssp. (NC)</i>	Bladder Saltbush		
<i>Austrodanthonia sp. (NC)</i>			
<i>Brachyscome sp.</i>	Native Daisy		
<i>Callithamnion circinnatum</i>			
<i>Caulocystis uvifera</i>			
<i>Champia zostericola</i>			
<i>Codium nuytsianum</i>			
<i>Coelarthrum opuntia</i>			
<i>Cystoseira trinodis</i>			
<i>Dilophus gunnianus</i>			
<i>Eremophila oppositifolia ssp.</i>	Opposite-leaved Emubush		
<i>Eremophila scoparia</i>	Broom Emubush		
<i>Herposiphonia rostrata</i>			
<i>Laurencia majuscula</i>			
<i>Malacocera biflora</i>	Two-flower Soft-horns		
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Polysiphonia decipiens</i>			
<i>Rhabdonia verticillata</i>			
<i>Rhodanthe pygmaea</i>	Pigmy Daisy		
<i>Sargassum spinuligerum</i>			
<i>Sclerolaena divaricata</i>	Tangled Bindyi		
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
<i>Solieria robusta</i>			
<i>Sporocchnus comosus</i>			
<i>Spyridia filamentosa</i>			
<i>Spyridia tasmanica</i>			
<i>Warrenia comosa</i>			



## Cell Descriptions – EP 1 Douglas Point

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Fauna

# of fauna in cell	10 (10*) recorded – 10 (10*) birds, 0 (0*) reptiles, 0 (0*) butterflies, 0 (0*) mammal, 0 (0*)amphibian (an additional 17 reptiles and 19 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	9 (3*) opportune sites
# of threatened fauna in cell	0 (0*)
# of non-indigenous fauna	1 (1* an additional invertebrate possible)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Sturnus vulgaris</i>	Common Starling	Aves	x
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Anthus australis</i>	Australian Pipit		
<i>Artamus cinereus</i>	Black-faced Woodswallow		
<i>Calidris ruficollis</i>	Red-necked Stint	M	
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Gavialis vireescens</i>	Singing Honeyeater		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Thalasseus bergii</i>	Greater Crested Tern	M	
<i>Tringa nebularia</i>	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

No butterfly species recorded in 2019 GIS data.

Species	Common Name	Status*	Record
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p

## Cell Descriptions – EP 1 Douglas Point

Species	Common Name	Status*	Record
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammals recorded in 2019 GIS data – only marine mammals in 2011 data (specimen collected of Long Nosed Fur Seal, *Arctocephalus forsteri*).

### Reptiles

No reptiles recorded in 2019 GIS data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Gehyra variegata</i>	Tree Dtella			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lerista edwardsae</i>	Myall Slider			c
<i>Lerista terdigitata</i>	Southern Three-toed Slider			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pseudonaja affinis</i>	Dugite			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

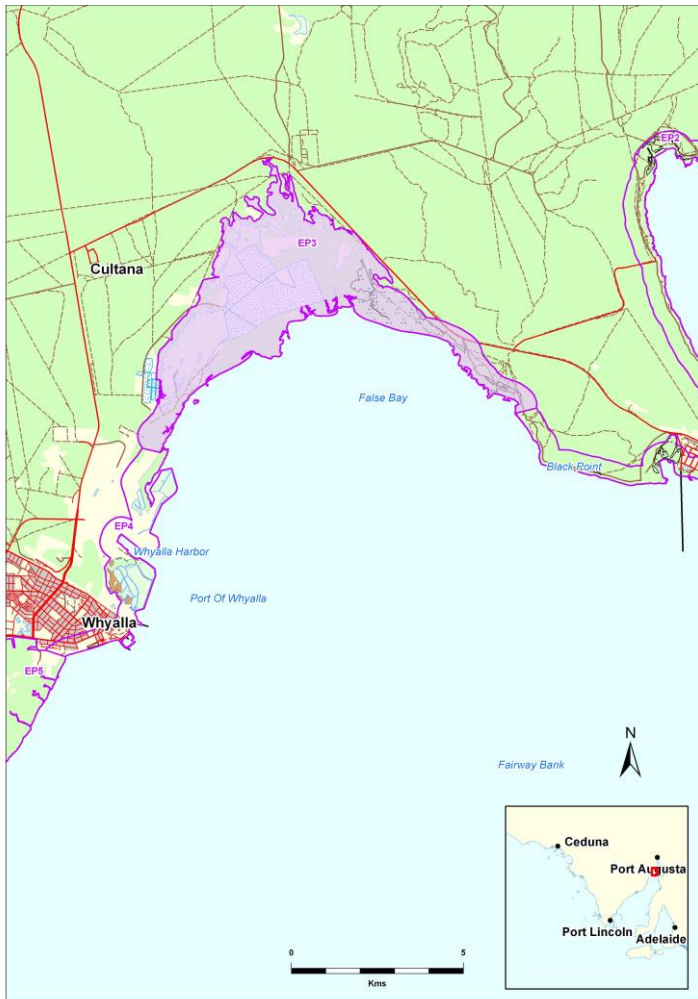
R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2011 or 2019.

**Cell EP 3 False Bay**

Cell area 2518.9 ha. Shoreline length 23.2 km.



Landforms

This is an extensive, low, open embayment that faces south. At the shoreline, this appears to have acted as a long-term sand trap; broad low tide sand flats extend over 2 km (at the centre of the bay) from a high tide beach to low tide seagrass. The beach is constructed of sand and shell grit; it is a low energy reflective high tide beach, backed by low sand ridges, then inter-tidal samphire that makes up the majority of the cell; the latter has in part been enclosed for saltpans. On the western side of the bay, the saltpans are fronted by the narrow coarse sand beach and dune ridges of a sand spit, apparently advancing towards the centre of the bay. Saltmarsh mapping records areas of lunettes north and east of the saltpans: topography, as shown on aerial photography, would suggest lunette accumulation from former adjacent ephemeral lake surfaces, due to strong SSW wind action. Elsewhere, mapping records intertidal

samphire associations. Additionally, low cliffs and slopes with small beaches and dunes extend eastward to Black Point; the largest of the small beach and dunes is at Weeroona Bay, where a (possibly Pleistocene) shingle ridge is found behind the foredune and fronting a dune system.

Benthic Habitat

Inshore bare sand, with dense seagrass offshore from coast to 1 km.

Biota

51.9% of the cell is remnant vegetation covering 1307 ha, 86% of which is saltmarsh. There are two opportune flora survey sites, one Herbarium flora record site, five flora survey sites and seven opportune fauna survey sites within this cell.

*Tecticornia arbuscula* shrubland is found seaward of the saltpans in the centre and west of the embayment. Dunes at the west of the bay show *Melaleuca lanceolata*, *Geijera linearifolia* shrubland on the north-western slopes and *Nitraria billardierei*, +/- *Olearia axillaris* mid open shrubland at the beach.

## Cell Descriptions – EP 3 False Bay

### Land Use/ Land Ownership

Traditional lands of the Barngarla people.

The dunes and heathland at the eastern quarter of the cell (14%) are Crown land Act Reserve.

Four shack sites are located at the eastern end of False Bay.

Upper Spencer Gulf Marine Park offshore.



**FIGURE 6.59 False Bay: Tidal flats, mangroves and saltmarsh; salt pans in background. Photo: Coast Protection Board, 2018.**

### Uses (Field visits and local reports)

Conservation – Upper Spencer Gulf Marine Park, Cuttlefish Coast Sanctuary Zone, cephalopod fishing closure.

Industry - Salt pans; Olssons Salt.

Steel works - Liberty OneSteel.

Commercial Fishing – Spencer Gulf prawn fisheries, marine scale fish, charter fishing, aquaculture.

Recreation & Tourism – Shacks, sightseeing, nature, hiking, ecotourism, swimming, snorkelling, fishing, cockling, informal camping, dog walking, ORV use, boating, kite boarding.

Boat launching – Beach launching.

### Values (Field visits and local reports)

Intertidal and subtidal rocky reef, mangroves, seagrass, sandy bottom, samphire.

Important breeding and juvenile habitat for Shorebirds, Pelican, King Prawns, Giant Australian Cuttlefish.

Barngarla Culture – Weeroona Bay Significant Area, fish traps.

## Cell Descriptions – EP 3 False Bay

### Threats (Field visits and local reports)

Potential Coastal Acid Sulphate Soils under extensive lowland.

ORV on degraded samphire areas and dunes.

Overfishing.

Dredging.

Feral animals – cats, foxes, goats.

Tourism –camp sites.

Pollution (rubbish and garden waste, marine debris, slag and discharges from Liberty OneSteel).

This major steelworks has operated at Whyalla since the 1950's. These industries have discharged metal rich effluent into the coastal waters of Yonga, resulting in widespread metal contamination of the sediments and biota. In recent years the loads of metals have reduced and there is some evidence to suggest some improvement in the contamination status of the region. Only one site showed a significant increase in seagrass, located adjacent the steelworks, which increased by almost 20% since 2012 (EPA, 2018).

Seagrass habitats along the south west and south east coasts displaying losses of seagrass in varying degrees. Almost 60% of seagrass was lost from False Bay outer, and 45% lost from Black point Inner sites.

### Opportunities (Field visits and local reports)

Monitoring – Support Shorebird Biannual Counts. Eyre Peninsula Whyalla Bird Group conduct a Summer Count in January (since 2016) and Winter Count in July (since 2019). EP Landscape Board Officers in Whyalla coordinate the counts and facilitate access to the count areas, Settlement Ponds (Bird Lake) and Lower Evaporators, which are on industrial leases Liberty Onesteel Whyalla, Olsson's Pacific Salt and BASF.

Collaboration between parties (e.g. EP Landscape Board, Whyalla City Council) support works associated with Whyalla Council Northern Coastline Masterplan and the Regional Development Australia (Whyalla and Eyre Peninsula).

Potential on-ground projects include working with Barngarla Determination Aboriginal Corporation towards improved Barngarla Culture educational and interpretation experiences.

### Conservation Analysis (GIS)

The sum of conservation means for this cell is low for this region at 88.98. While there are moderate totals found on the sand dune and sand ridge areas as well as the chenopod shrubland slopes, there are large areas with low/moderate (intertidal samphire) and very low totals (salt pans). This low valuation of the saltmarsh may reflect the lack of biological survey sites within the entire saltmarsh area of this cell – mainly remote sensing data has been used; also, the extensive salt pans attract a very low total. Combined these factors may have led to a significant undervaluation for this cell. Examination of the components of this score shows only one high value layer: for the cell total of state rarity of coastal dune and cliff top associations. Moderate totals are seen for mammal, reptile (dunes), threatened bird species (saltmarsh), butterfly habitat (dunes and saltmarsh), and wetland significance.

The 2019 review showed an increase of seven additional native flora species recorded in addition to the 2011 data and two additional weed records, bringing the total number of species from 28 records to 35 records by 2019.

The 2019 review showed an increase of six additional native fauna species that were recorded since the 2011 data including two rated species including the Common Tern, *Sterna hirundo*, rated as rare under the *National Parks and Wildlife Act 1972*, and the Far Eastern Curlew, *Numenius madagascariensis*, listed as critically endangered under the *Environment Protection and Biodiversity*



## Cell Descriptions – EP 3 False Bay

*Conservation Act 1999*, bringing the total number of species from 12 records to 14 records in 2019. With this cell being on the upper end of the low conservation rating, the addition of two threatened fauna species and increase in species richness could elevate this cell to a medium conservation rating.

### Threat Analysis (GIS)

The total of threat means is very high for the region at 58.867: all parts of the cell record high or medium high totals, and the saltmarsh and salt pans show very high threat totals. Development zoning, land ownership and land use, viewscape, and mining (salt pans, and petroleum exploration licenses cover the whole cell, except part of the dunes) all make large contributions to this total. ORV activity is recorded, notably at the western end of the cell near the shack sites, where butterfly and reptile shrubland habitat is degraded by this activity. Potential acid sulphate soil development is flagged in saltmarsh areas.

It is likely that the area impacted by ORV and campsites has increased since 2011. There were also two additional weed species recorded since 2011, including one Red alert species, Ward's Weed *Carrichtera annua*, and one Declared weed species, Onion Weed, *Asphodelus fistulosus*, maintaining the cells high threat rating.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Beach recession and dune instability due to foredune damage; Changes in frequency and duration of tidal flooding in saltmarsh; 'Coastal Squeeze' phenomenon affecting Shrubby Samphires.	Active management of dunes to slow recession and consider possible retreat buffer zones to allow for transgressive movement of dunes in response to sea level rise; Establish a saltmarsh profile to monitor for saltmarsh change; Consider possible retreat buffer zones or tide-dependant ecosystems; Re-zoning land use and development plans to	

## Cell Descriptions – EP 3 False Bay

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
		create a buffer zone for recession.	
2070: +c.80cm	Dune instability and movement further increased; Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale <i>Intensity</i> of large storms increases	Occasional storm tide flooding above highest known tides: damage to foredunes; Inundation of samphire areas.	Continue to monitor shoreline movement and saltmarsh boundaries in order to manage adaptively; Active management of dunes.	
<b>Warmer average conditions:</b> 2030:+0.3 to 0.6°C 2070:+1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses; Chenopod shrubs on the coastal slopes likely to adapt well to increasing aridity.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Dry creek beds on the coastal slopes are mobilised by these rare events, bringing sediment to coastal saltmarsh and nearshore areas.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes.	Adaptive management of plant assets.	Monitor groundwater levels.

## Cell Descriptions – EP 3 False Bay

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement; Long-term onshore movement of calcareous sediments potentially reduced by increasing seawater acidity.		

**TABLE 6.55 Recommended Actions and Priority for EP3 False Bay**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Climate change and ongoing and accelerating sea level rise beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board

## Cell Descriptions – EP 3 False Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
	There is a high level of ORV activity evidenced by multiple tracks and informal car parking.	<p>Develop access management plan, including review of existing access with a view to rationalise unnecessary tracks and car parks;</p> <p>Block access (e.g. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain;</p> <p>Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion;</p> <p>Install directional/ educational signage;</p> <p>Maintenance of previous access management works;</p> <p>Community education.</p>	Moderate (cons/threat)	community, Whyalla City Council, EP Landscape Board, DEW, DPTI, Tourism SA
	Informal camping with potential impact from soil compaction, vegetation damage (trampling and removal), fauna disturbance, soil erosion, dune instability, increased fire risk, fire wood collection and weed introduction.	<p>Monitor impacts of camping;</p> <p>Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage &amp; maintain (e.g. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed.</p>	Medium (cons/threat)	DEW, EP Landscape Board, Whyalla City Council, community, Tourism SA

## Cell Descriptions – EP 3 False Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
	Weed species identified throughout cell.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/threat)	EP Landscape Board, landowners, DEW, Whyalla City Council, community
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, Whyalla City Council.
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, landowners, community groups, Whyalla City Council, EP Landscape Board, DEW, DPC
Saltmarsh	Tide-dependant mangrove and saltmarsh need space to retreat with sea level rise.	Modify land use and development plans to create buffer zone for saltmarsh retreat.	Medium (cons/threat)	DEW, EP Landscape Board, Whyalla City Council



## Cell Descriptions – EP 3 False Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
	Change in frequency and duration of tidal flooding leads to species change in samphire communities - field survey data for flora and fauna within the saltmarsh is inadequate.	Monitor saltmarsh change through the establishment of a profile survey line to record current values and to monitor change, as a basis for adaptive management. Investigate opportunities to modify land use and development plans to create buffer zone for saltmarsh retreat (in accordance with EP regional plans).	High (cons/threat)	DEW
	Significant reptile and butterfly habitat near shack area in western end of cell is degraded by ORV tracks - this habitat has little resilience to this kind of threat.	Work with local users to rationalise access; Community education on the values of this area.	High (Cons/Threat)	EP NRM, Whyalla City Council, community, Tourism SA
Seagrass	Monitoring has identified many seagrass habitats under significant stress due to nutrient enrichment causing excessive epiphyte growth. 60% seagrass loss recorded from False Bay outer site.	Continue EPA Nearshore Marine Aquatic Ecosystem Condition Monitoring.	High (cons/threat)	EPA, DEW, EP Landscape Board

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	1306.97 (51.89 % of Cell)
<b># flora surveys / records</b>	5 (5*) flora surveys, 2 (0*) opportune sites, 1 (1*) Herbarium record
<b># flora in cell</b>	35 (28*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	6 (4*)
<b>Significant CDCS floristic community</b>	<i>Atriplex vesicaria</i> sssp. shrubland – 71% of SA records in EP <i>Halosarcia indica</i> ssp. shrubland – 83% of SA records in EP <i>Melaleuca lanceolata</i> / <i>Tetragonia implexicoma</i> shrubland – 72% of SA records in EP
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

## Cell Descriptions – EP 3 False Bay

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Hornungia procumbens</i>	Oval Purse		0
<i>Sisymbrium erysimoides</i>	Smooth Mustard		0
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Atriplex paludosa</i> ssp. <i>cordata</i>	Marsh Saltbush		
<i>Atriplex stipitata</i>	Bitter Saltbush		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Calandrinia</i> sp.	Purslane/Parakeelya		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily		
<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus socialis</i> (NC)	Beaked Red Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Gramineae</i> sp.	Grass Family		
<i>Lawrenzia squamata</i>	Thorny Lawrenzia		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree		
<i>Myoporum insulare</i>	Common Boobialla		
<i>Nitraria billardiieri</i>	Nitre-bush		
<i>Parietaria debilis</i> (NC)	Smooth-nettle		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Rhagodia parabolica</i>	Mealy Saltbush		
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
<i>Senecio glossanthus</i> (NC)	Annual Groundsel		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Tecticornia indica</i> ssp. <i>leiostachya</i>	Brown-head Samphire		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Vittadinia</i> sp.	New Holland Daisy		

## Cell Descriptions – EP 3 False Bay

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Fauna

# of fauna in cell	46 (45*) recorded – 46 (45*) birds, 0 (0*) reptiles, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 16 reptiles and 19 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	0 (0*) survey sites, 7 (4*) opportune sites
# of threatened fauna in cell	14 (12*)
# of non-indigenous fauna	3 (2*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund

### Birds

Species	Common Name	Aus status	SA status
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Biziura lobata</i>	Musk Duck		R
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris canutus</i>	Red Knot	E	
<i>Calidris ferruginea</i>	Curlew Sandpiper	C	
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Calidris tenuirostris</i>	Great Knot	C	R
<i>Charadrius leschenaultii</i>	Greater Sand Plover	V	R
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chlidonias hybrida</i>	Whiskered Tern		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Corvus coronoides</i>	Australian Raven		
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel		

## Cell Descriptions – EP 3 False Bay

Species	Common Name	Aus status	SA status
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco longipennis</i>	Australian Hobby		
<i>Garicalis virescens</i>	Singing Honeyeater		
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Himantopus leucocephalus</i>	White-headed Stilt		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Limosa lapponica</i>	Bar-tailed Godwit		R
<i>Malurus lamberti</i>	Variiegated Fairywren		
<i>Nesoptilotis leucotis</i>	White-eared Honeyeater		
<i>Numenius madagascariensis</i>	Far Eastern Curlew	C	V
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon nigricans</i>	Tree Martin		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		
<i>Sterna hirundo</i>	Common Tern		R
<i>Thalassens bergii</i>	Greater Crested Tern		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Tringa stagnatilis</i>	Marsh Sandpiper		
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

No butterfly species recorded in 2019 GIS data.

Species	Common Name	Status*	Record
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R, Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC, Mi	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Vanessa itea</i>	Australian Admiral	LU, Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC, Mi	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

## Cell Descriptions – EP 3 False Bay

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammal species recorded in 2019 GIS data. 2011 data includes cetaceans or subfossil records.

### Reptiles

No reptile species recorded in 2019 GIS data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Gehyra variegata</i>	Tree Dtella			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lerista edwardsae</i>	Myall Slider			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pseudonaja affinis</i>	Dugite			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

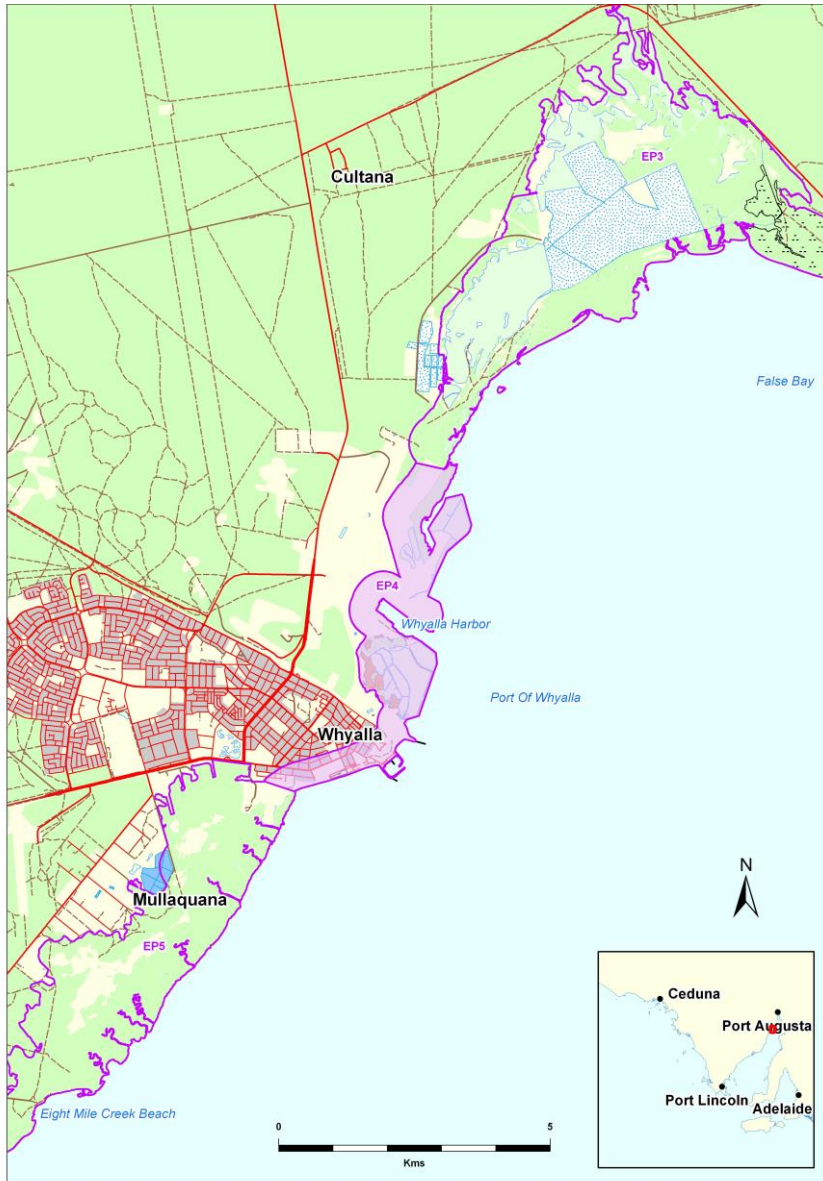
### Amphibians

No amphibian species recorded in 2019 data or 2011 data.



**Cell EP 4 Whyalla**

Cell area 674.65 ha. Shoreline length 19 km.



Landforms

This coastal plain has almost entirely been modified by urbanisation, port development and creation of saltpans; port development has filled mangrove and saltmarsh habitats along the shore. The southern half of the city is underlain by meso-proterozoic sediments: the topography of this area appears to have inherited elements of pre-Holocene conditions; the northern part of the cell, a coastal plain, is underlain by Pleistocene sands.

Benthic Habitat

Medium to dense seagrass with some areas of macroalgae are found off Whyalla; there is inshore clear sandy bottom off the coarse sand beach in the southern end of the cell.

Biota

Remnant vegetation is 59 ha, covering 9% of the cell. 88% of which is saltmarsh.

There is one opportune flora survey site, 17 herbarium flora record sites and seven opportune fauna survey sites within this cell. Some areas of *Maireana sedifolia* mid-sparse shrubland are mapped on the fringes of the builtup area; mangroves and saltmarsh are recorded in the NW of the cell.

Land Use/Land Ownership

Traditional lands of the Barngarla people. 4% of the cell, covering 24 ha, is Crown land Act Reserve. 26% of cell, covering 173 ha is under Crown land leasehold to Whyalla City Council and Onesteel.

Upper Spencer Gulf Marine Park offshore.

## Cell Description – EP 4 Whyalla

### Uses (Field visits and local reports)

Conservation – Upper Spencer Gulf Marine Park Sanctuary Zone.

Industry – Liberty Onesteel Steelworks.

Port/Shipping – Port of Whyalla (GFG Alliance) Inner Harbour, GFG Alliance trans-shipping; Whyalla Marina.

Commercial Fishing – Marine scale fish, charter fishing.

Recreation & Tourism – Caravan Park (Discovery Parks Whyalla foreshore), sightseeing, nature, hiking, ecotourism, swimming, snorkelling, fishing jetty and beach, cockling, crabbing, dog walking, horse riding, boating, kite-boarding, kayaking, stand-up paddle boarding (SUP), dolphin tourism.

Boat launching – Boat ramp.



**FIGURE 6.60** Looking south across the steelworks, port and city of Whyalla. Photo: Coast Protection Board, 2018.

### Values (Field visits and local reports)

Conservation - Intertidal mangroves, samphire, seagrass, sandy bottom.

Important marine habitat for threatened Indo-Pacific Bottlenose Dolphin, as well as Blue Swimmer Crabs, Rays and Snapper.

Barngarla Culture – Significant cultural site associated with Seven Sisters dreaming.

### Threats (Field visits and local reports)

Industry – Discharges from Liberty Onesteel steelworks.

This major steelworks has operated at Whyalla since the 1950's. These industries have discharged metal rich effluent into the coastal waters of Yonga, resulting in widespread metal contamination of the sediments and biota. In recent years the loads of metals have reduced and there is some evidence to suggest some improvement in the contamination status of the region. Only one site

## Cell Description – EP 4 Whyalla

showed a significant increase in seagrass, located adjacent the steelworks, which increased by almost 20% since 2012 (EPA, 2018).

Overfishing – Snapper, King-George whiting.

Feeding and touching of wild dolphins in marina area.

Uncontrolled Access – track creation at Newton Street to beach; disturbance of shorebirds/ beach nesting birds; dune vegetation destruction.

Stormwater impacts – erosion, weed proliferation.

Pollution - rubbish dumping, marine debris, stormwater outflow, former landfill site Newton Street.

Feral animals – Foxes, Cats.

Climate change – storm surge.

Future development – residential; ecotourism (dolphin viewing platform, interpretation); infinity jetty.

### Opportunities (Field visits and local reports)

Collaboration and partnerships between EP Landscape Board, DEW, Whyalla City Council, local schools/businesses:

- Whyalla Foreshore and Marine Park Education - outdoor classroom.
- Potential site for Ausmap Microplastics Monitoring involving schools.
- Potential site for marine debris monitoring - Tangaroa Blue methodology - National Database.
- Work with GFG Alliance at Hummock Hill on revegetation and weed control.

Collaboration and partnerships between EP NRM and Whyalla City Council

- Development and implementation of citizen science monitoring program and community education program regarding resident dolphin pod at Whyalla marina and beach. This data can be used to inform future management of human/dolphin interactions.
- Foreshore development incorporating art-science interpretive information on local flora-fauna.
- Cuttlefish seat to be installed near Beach Cafe.

Potential on-ground projects include working with Barngarla Determination Aboriginal Corporation towards improved Barngarla Culture educational and interpretation experiences. Dive ladder on new jetty for scuba, snorkelling access and artificial habitat in jetty shadow to increase biodiversity and create ecotourism opportunities.

### Conservation Analysis (GIS)

The total for conservation means is 47.97, the lowest score in the region. The detailed summary map of conservation values shows almost the whole cell with very low total values and some small vegetated areas with low to medium totals; these include mangroves, chenopod shrublands and a small dune area south of Whyalla township. The industrial, port and intense urban uses of this coastal area have left few habitats. However, values for indigenous heritage, for viewshed, and habitat for threatened mammals are recorded; even these values are a little misleading, as they have been generalised small to wider extents. Bird habitat (notably the Pied Oystercatcher) totals moderate values in the mangroves and saltmarsh near the northern harbour, and in small wetlands north of the urban area.

The 2019 review showed an increase of 10 additional native flora species recorded in addition to the 2011 data including six additional weed records, bringing the total number of species from 27 records to 41 records by 2019. While there is the addition of one conservation rated flora species, Australian Broomrape, *Orobanche cernua* var. *Australiana*, rated as rare under the *National*

## Cell Description – EP 4 Whyalla

*Parks and Wildlife Act 1972* (NPW Act), it is unlikely that the limited, additional information since 2011 would have changed the conservation rating of the cell. Furthermore, the 2019 review showed an increase of 14 additional native fauna species, recorded since the 2011 data, bringing the total number of species from 38 records analysed in 2011 to 47 records in 2019. One of these new records included a species with a conservation rating, the Far Eastern Curlew, *Numenius madagascariensis*, rated as vulnerable under the NPW Act and critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999*. Despite, the increase in species richness, and addition of species with conservation ratings, it is unlikely that the limited additional information since 2011 would have changed the conservation rating of the cell.

### Threat Analysis (GIS)

The total of threat means is 54.14, high for the region. High scores for development zoning, land ownership and land use, viewshed, existing development, and vegetation block degradation (high % of exotic species) contribute to this large threat total. The detailed map of threat means shows medium high to very high totals throughout the cell; small areas near the dunes in the southern end of the cell show only moderate threat totals – this dune area is recorded as stable.

It is likely that the area impacted by ORV has increased since 2011 and there were seven additional weed species recorded since 2011, including one Declared weed species, maintaining the cells high threat rating.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

The highly modified nature of the coastal lands of this cell, and the small remaining habitats, suggest the impacts of climate change will depend greatly on ongoing response to change and urban risk assessment. These are largely outside the scope of this project; but the small areas of intertidal flora – mangrove and samphire - will be greatly affected by changing tide heights.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise: 2030 : +c.20cm</b>	Beach recession and dune instability due to foredune damage. Increase in dune mobility; Changes in frequency and duration of tidal flooding in saltmarsh.	Active management of dunes to slow recession; Establish a photographic record to monitor for salt marsh change, as a basis for adaptive management; Consider possible retreat buffer zones for	

## Cell Description – EP 4 Whyalla

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
		tide-dependant ecosystems; Re-zoning on land use and development plans needed to create a buffer zone for recession.	
2070: +c.80cm.	Dune instability and movement further increased; Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale <i>Intensity</i> of large storms increases	Occasional storm tide flooding above highest known tides: damage to foredunes; inundation of samphire areas.	Continue to monitor shoreline movement and salt marsh boundaries; Active management of dunes.	
<b>Warmer average conditions:</b> 2030:+0.3 to.6°C 2070:+1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Dry creek beds on the coastal slopes are mobilised by these rare events, bringing sediment to coastal saltmarsh and nearshore areas.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes.	Adaptive management of plant assets.	
<b>Nearshore sea changes - temperature;</b>	Persistent swell wave climate maintains sediment movement;		

## Cell Description – EP 4 Whyalla

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Long term onshore movement of calcareous sediments potentially reduced by increasing seawater acidity.		

**TABLE 6.56 Recommended Actions and Priority for EP4 Whyalla**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Indigenous heritage values are present within this coastal zone, and threatened by a variety of uses.	Continue to consult with traditional owners on the appropriate management for these sites.	Medium (cons/threat)	Traditional owners, DEW, Whyalla City Council, EP Landscape Board
	Climate change and ongoing and accelerating sea level rise beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
Saltmarsh	Tide-dependant mangrove and saltmarsh need space to retreat with sea level rise.	Modify land use and development plans to create buffer zone for saltmarsh retreat, (and in accordance with EP ‘Better development plans’).	Medium (cons/threat)	Whyalla City Council, DPC Planning, DEW
	Change in frequency and duration of tidal flooding leads to species change in samphire communities.	Establish a photographic record to monitor this change.	High (cons/threat)	DEW, EP Landscape Board
Pied Oystercatcher habitats	The habitats on the coastal mudflats and mangroves, are close to the existing urban development.	Encourage monitoring of these bird populations.	High (cons/threat)	DEW, EP Landscape Board

## Cell Description – EP 4 Whyalla

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	58.97 ha (8.74 % of the cell)
<b># flora surveys / records</b>	0 (0*) surveys, 1 (0*) opportune sites, 17 (6*) Herbarium records
<b># flora in cell</b>	41 (27*)
<b># conservation rated flora in cell</b>	1 (0*)
<b># non-indigenous flora in cell</b>	11 (6*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	100% of the vegetation in the cell is protected.

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Bryophyllum delagoense</i>			-
<i>Cakile maritima ssp. maritima</i>	Two-horned Sea Rocket		1
<i>Cenchrus setaceus</i>	Fountain Grass	D	-
<i>Euphorbia maculata</i>	Eyebane		-
<i>Glandularia aristigera</i>	Mayne's Pest		-
<i>Limonium sinuatum</i>	Notch-leaf Sea-lavender		3
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Orbea variegata</i>	Carrion-flower	D, RA	4
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Sisymbrium erysimoides</i>	Smooth Mustard		0

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

#### Native flora

Species	Common Name	Aus status	SA status
<i>Alyogyne huegelii</i>	Native Hibiscus		
<i>Asparagopsis armata</i>			
<i>Atriplex holocarpa</i>	Pop Saltbush		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Boerhavia coccinea</i>	Tar-vine		
<i>Bonnemaisonia australis</i>			
<i>Botryocladia sonderi</i>			
<i>Calotis erinacea</i>	Tangled Burr-daisy		



## Cell Description – EP 4 Whyalla

Species	Common Name	Aus status	SA status
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting		
<i>Cryptandra</i> sp. <i>Floriferous</i> (W.R.Barker 4131)	Pretty Cryptandra		
<i>Cynanchum viminalis</i> ssp. <i>australe</i>	Caustic Bush		
<i>Dodonaea baueri</i>	Crinkled Hop-bush		
<i>Eremophila deserti</i>	Turkey-bush		
<i>Erodium crinitum</i>	Blue Heron's-bill		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Glischrocaryon flavescens</i>	Yellow Pennants		
<i>Hypnea charoides</i>			
<i>Lasiopetalum behrii</i>	Pink Velvet-bush		
<i>Minuria cunninghamii</i>	Bush Minuria		
<i>Myoporum platycarpum</i> ssp. <i>platycarpum</i>	False Sandalwood		
<i>Myriodesma integrifolium</i>			
<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R
<i>Philotheca linearis</i>	Narrow-leaf Wax-flower		
<i>Polysiphonia scopulorum</i>			
<i>Ptilotus obovatus</i>	Silver Mulla Mulla		
<i>Roepera confluens</i>	Forked Twinleaf		
<i>Sarcozona praecox</i>	Sarcozona		
<i>Senecio spanomerus</i>			
<i>Sida petrophila</i>	Rock Sida		
<i>Trymalium wayi</i>	Grey Trymalium		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	47 (38*) recorded – 46 (35*) birds, 0 (0*) reptiles, 0 (0*) butterflies, 1 (3*) mammals, 0 (0*) amphibian (an additional 17* reptiles and 19* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	(0*) survey sites, (7*) opportune sites
<b># of threatened fauna in cell</b>	4 (4*)
<b># of non-indigenous fauna</b>	4 (4*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Spilopelia chinensis</i>	Spotted Dove	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Cell Description – EP 4 Whyalla

**Birds**

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata</i>	Red Wattlebird		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chlidonias hybrida</i>	Whiskered Tern		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Corvus mellori</i>	Little Raven		
<i>Daphoenositta chrysoptera</i>	Varied Sittella		
<i>Dromaius novaehollandiae</i>	Emu		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Falco berigora</i>	Brown Falcon		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus lamberti</i>	Variegated Fairywren		
<i>Malurus leucopterus</i>	White-winged Fairywren		
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Numenius madagascariensis</i>	Far Eastern Curlew	C	V
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon nigricans</i>	Tree Martin		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis</i>	White-browed Scrubwren		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

## Cell Description – EP 4 Whyalla

### Butterflies

Species	Common Name	Status*	Record
<i>Belenois java teutonia</i>	Caper White	migrant	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R and vagrant	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	migrant	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC and migrant	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	Locally uncommon	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	Locally uncommon	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	vagrant	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	Locally uncommon	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Vanessa itea</i>	Australian Admiral	Locally uncommon, migrant	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC and migrant	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

Species	Common Name	Aus status	SA status
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal (New Zealand Fur Seal)	Least Concern	Marine Mammal

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

### Reptiles

No reptile species recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Gehyra variegata</i>	Tree Dтеля			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lerista edwardsae</i>	Myall Slider			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e

## Cell Description – EP 4 Whyalla

Species	Common Name	Aus status	SA status	Record
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pseudonaja affinis</i>	Dugite			c
<i>Pseudonaja aspidorhyncha</i>	Patch-nosed Brown Snake			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

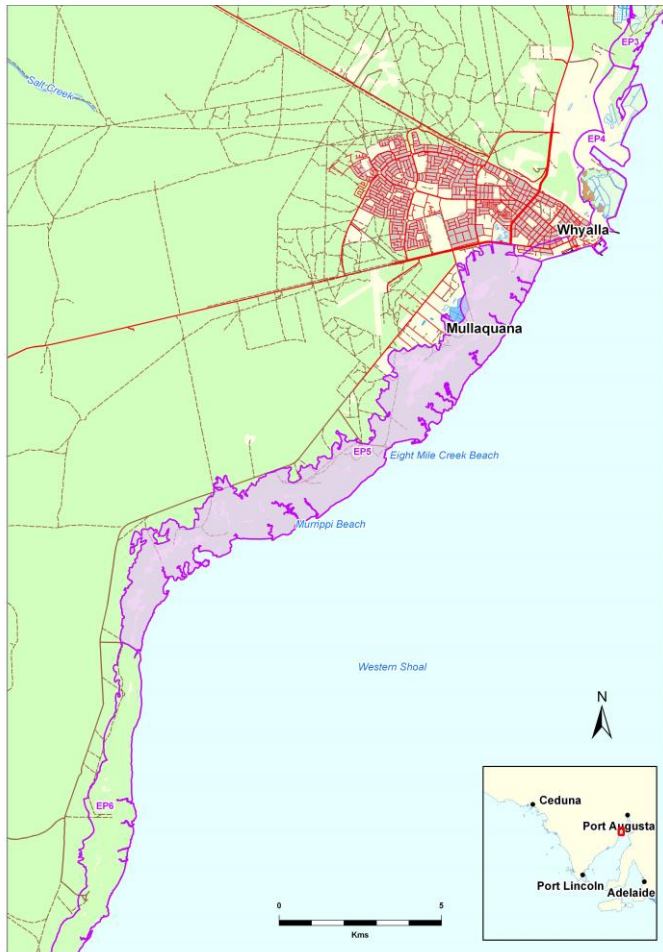
R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2019 data or 2011 data.

### Cell EP 5 Eight Mile Creek

Cell area 2709.76 ha. Shoreline length 51.6 km.



#### Landforms

Almost the entire cell is a coastal wetland and subject to tidal flooding: composed of intertidal and supra-tidal samphire, intertidal mud and sand flats, intertidal melaleuca, mangrove, low tide sand and mud flats; beach ridges and cheniers are cut by frequent short tidal inlets, which connect the whole saltmarsh to tidal waters. This is a low energy accreting coast; it is mainly a mangrove shoreline (with some accretion of land-based sediment with mangrove colonisation near the mouths of tidal creeks), but there are four short stretches of reflective, high tide, shellgrit beach. Slow northerly sand movement takes place along bare sub-tidal to low tide sand flats. Above the supra-tidal areas backing the saltmarsh there are small areas of *Atriplex* and *Maireana* shrublands over red Pleistocene sands.

#### Benthic Habitat

For much of the cell there is bare inshore sand to 1 km, then dense to mid-dense seagrass; the north-west quarter of the cell records seagrass close inshore.

#### Biota

Remnant vegetation covers an area of 2405.05 ha, 89% of the cell. There are eight herbarium flora survey sites, two opportune flora record sites and 31 opportune fauna record sites in this large cell. Most of the shoreline is *Avicennia marina* ssp. *marina* low open forest over +/- *Tecticornia* sp., +/- *Sarcocornia quinqueflora* shrubs. At mid to supra-tide levels *Tecticornia halocnemoides* ssp., +/- *Tecticornia arbuscula*, +/- *Maireana oppositifolia*, +/- *Frankenia pauciflora* var., +/- *Wilsonia humilis* low shrubland is found. Bordering the saltmarsh there is *Atriplex vesicaria* ssp., +/- *Maireana sedifolia*, +/- *Maireana pentatropis* low arid shrubland.

#### Land Use/ Land Ownership

Traditional lands of the Barngarla people.

Cowleds Landing Sanctuary Zone in Upper Spencer Gulf Marine Park in southern 75% of the cell, established to protect important mangrove, samphire and nearshore fish nursery habitats.



**FIGURE 6.61 Eight Mile Creek. Photo: Coast Protection Board, 2018**

Uses (Field visits and local reports)

Agriculture – Grazing.

Commercial fishing – Marine scale fish, prawns, cockling, charter fishing.

Residential/Shacks (Mullaquana lifestyle blocks; Cowleds Landing shacks).

Conservation (Cowleds Landing Sanctuary Zone in Upper Spencer Gulf Marine Park).

Recreation & Tourism – Caravan Park (Whyalla), sightseeing, nature, hiking, swimming, kite boarding, snorkelling, recreational fishing, cockling, camping (formal and informal), horse riding (Trotter training), dog walking, ORV use (four wheel drives, motorbikes), nudist beach (Murrippi), boating.

Boat launching – Beach launching.

Values (Field visits and local reports)

Conservation – Temperate coastal saltmarsh, tidal creeks, mudflats, sand flats, samphire, mangroves; important habitat for shorebirds, fish/invertebrate nursery area.

Threats (Field visits and local reports)

Agriculture.

Pollution – rubbish and garden waste dumping; marine debris; pet burial ground at Eight Mile Beach in Sanctuary Zone.

Dog walking – faeces pollution and shorebird disturbance

ORV use – vegetation loss/destruction, dune erosion, driving on beach threat to beach nesting birds.

Informal camping – toilet waste, rubbish, fires and firewood collection, weeds, vegetation disturbance.

Fishing - Illegal fishing in Cowleds Landing Sanctuary Zone; digging mangrove worms for bait.

## Cell Descriptions – EP 5 Eight Mile Creek

Horse riding (trotters).  
Feral animals – Foxes, cats, rabbits, goats.  
Weed infestation.  
Firewood collection.

### Opportunities (Field visits and local reports)

Collaborations:

Local schools

- Mangrove-Saltmarsh Field Trips to Cowleds Landing Sanctuary Zone.
- NRM and Marine Park Education – Outdoor classroom Saltmarsh Ecology.
- Saltmarshes and Sanctuary Zones Education Resources.
- Creating Lasting Connections with the Ocean Project.

Business

- Collaboration with Spencer Gulf Prawn fisheries.
- Mangrove-Saltmarsh Boardwalk and interpretive walking trail.

Management Plans

- vegetation, pest plant control, access management.
- management of illegal dumping.

On ground:

- Pix Stix. Citizen Science Photo Point Monitoring <http://www.pixstix.com.au/>

Monitoring:

Limited amount of survey works have occurred in the region, Flora, invertebrates, reptiles. Better records for birds.

### Conservation Analysis (GIS)

The total of conservation means is 81.91, low for the region. Detailed summary mapping shows the whole of the cell with below average values: medium/low, low/medium in mangroves and sand ridges, and low totals in the supra-tidal samphire and intertidal melaleuca areas. Moderate conservation scores accrue for threatened mammal, bird, butterfly and reptile habitats, for Pied Oystercatcher (focal species), vegetation metrics and wetland value. There are some low to medium values for numbers of threatened species and for species richness. No heritage values are recorded in this cell. The low total can be explained by the total lack of value for vegetation associations as well as lack of detailed mapping of fauna species within the saltmarsh. This low valuation of the saltmarsh reflects its lack of threatened species and communities and diversity of species. In addition, this collation and valuation does not reflect the valuable ecological connection with the nearshore environment, as shown by the establishment of the former Whyalla–Cowleds Landing Aquatic Reserve, now a Sanctuary Zone in the Upper Spencer Gulf Marine Park. In conclusion, a low conservation score may well be a significant under-valuation for this cell.

The 2019 review showed an increase of 12 additional native flora species recorded since the 2011 data, including one species with a conservation rating, Australian Broomrape, *Orobanche cernua* var. *Australiana*, rated as rare under the *National Parks and Wildlife Act 1972*, bringing the total number of species from nine records in 2011 to 20 records by 2019. It should be noted that one flora species that was recorded as occurring in 2011 has since been removed in a BDBSA data update process (e.g. it may have been unreliable) and accordingly, only eight are listed in the table below.

The 2019 review showed an increase of 23 additional native fauna species that were recorded since the 2011 data including an additional five rated species, bringing the total number of species from 34 records in 2011 to 57 records in 2019. A number of new fauna species records include species with a conservation rating including the Banded Stilt, *Cladorhynchus leucocephalus*,



## Cell Descriptions – EP 5 Eight Mile Creek

rated as vulnerable under the *National Parks and Wildlife Act 1972* (NPW Act), the Little Egret, *Egretta garzetta*, the Sooty Oystercatcher, *Haematopus fuliginosus*, the Scarlet Robin, *Petroica boodang boodang*, rated as rare under the NPW Act, and the Hooded Plover, *Thinornis cucullatus*, rated as vulnerable under the NPW Act and the *Environment Protection and Biodiversity Conservation Act 1999*. With this cell being on the upper end of the low conservation rating, the addition of five threatened fauna species and increase in species richness could elevate this cell to a medium conservation rating.

### Threat Analysis (GIS)

The total of threat means, 39.161, is moderate for the region. There is a clear geographic pattern of detailed threat totals: medium to low totals in the mangroves; medium to high values on the beach ridges and cheniers; high total threats on the supra-tidal samphire areas and chenopod shrublands. Threat total values increase approaching Whyalla. Some threat layers show relatively high means: off-road vehicle activity (there is extensive impact on supratidal areas throughout the cell; notably between Eight Mile Creek Road and Berkshire Road), mining lease (2.5 km SW of Eightmile Creek Beach) and mineral exploration licence over the entire area above mid-tide, viewshed and potential acid sulphate soil. Informal campsites are found in places within the saltmarsh, notably near Eight Mile Creek Beach. There is an effluent pond at the edge of the supra-tidal samphire immediately south of Whyalla.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, which may also have increased the vegetation degradation. There are local reports of weeds and feral species, but these have not been recorded within the Biological Database of SA and therefore would not impact on the GIS analysis. However, a significant proportion of the cell is now within the Upper Spencer Gulf Marine Park, which may have lowered the threat rating of the Land Ownership and Land Use layers. Overall, it is unlikely that the score would have changed sufficiently to increase or decrease the threat rating from medium.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element / scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Local beach recession and beach ridge instability due to foredune damage; More frequent and longer tidal flooding of saltmarsh leading to species change	Monitor aerial photographic record; Consider possible retreat buffer zones for tide-dependant ecosystems (re-	

## Cell Descriptions – EP 5 Eight Mile Creek

Climate change element / scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	and changes in species distribution.	zoning land use in development plans); Monitor the security of the sewage works south of Whyalla.	
2070: +c.80cm.	Migration of mangroves and samphire in response to changing tide heights; Sediment accretion and mangrove colonisation uncertain.	Ensure circulation of tidal waters to saltmarsh.	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale <i>Intensity</i> of large storms increases.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes.	Continue to monitor shoreline movement and saltmarsh boundaries;	
<b>Warmer average conditions:</b> 2030: +0.3 to .6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Habitats on beach ridges and cheniers adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Monitor habitat change as part of saltmarsh monitoring.	
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Rare flood run-off may deliver sediment, raising saltmarsh land levels.		
<b>Groundwater lowering; saline incursion:</b>	Groundwater already saline in this cell. Tidal creek flow within saltmarsh essential to samphire survival.	Ensure tidal creek flow within saltmarsh is maintained.	
<b>Nearshore sea changes - temperature; acidity; wave climate:</b>	Persistent swell wave climate maintains direction of sediment movement; Continuing nearshore supply of biogenic (calcareous) sands		

## Cell Descriptions – EP 5 Eight Mile Creek

Climate change element / scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	uncertain because of increasing ocean acidity.		

**TABLE 6.57 Recommended Actions and Priority for EP5 Eight Mile Creek**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Extensive impact from unrestricted access across cell (including within the Marine Park Sanctuary Zone) resulting in destruction of plant species, soil compaction, weed introduction, and disturbance to native fauna species.	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education.	High (cons/threat)	EP Landscape Board, DEW, Whyalla City Council, PIRSA Fisheries
	Very inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DEW, EP Landscape Board
	Ongoing and accelerating sea level beginning to cause change in saltmarsh.	Create a baseline for monitoring shoreline and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board

## Cell Descriptions – EP 5 Eight Mile Creek

	Weed and feral species identified in field reports but there have been no official records.	Undertake pest animal and plant surveys and if required develop and implement weed management plan (including monitoring and recording pest species, removal and rehabilitation as required).	Medium (cons/threat)	DEW, EP Landscape Board, Whyalla City Council, land owners
Saltmarsh	Tide-dependant mangrove and samphire are critically affected by continuing and accelerating sea level rise leading to change in frequency and height of tidal flooding; they need space to retreat and accommodate this change. Potentially resulting in loss of seagrass offshore and loss of fish.	Establish a saltmarsh profile to monitor change (including sedimentation rates), and improve flora mapping to be used as a basis for adaptive management.	High (cons/threat)	DEW, EP Landscape Board
	Possible future development within areas that could be used to allow saltmarsh retreat with rising sea levels.	Modify land use and development plans to create buffer zone for saltmarsh retreat.	High (cons/threat)	DEW, DPC Planning, EP Landscape Board, Whyalla City Council
	Potential pollution or habitat degradation from increased nutrients from the sewage works.	Monitor impacts of sewage works discharge.	Moderate (threat)	Whyalla City Council, EPA
	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (hazard)	Whyalla City Council, DEW, developers, land owners

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	2405.05 ha (88.76 % of the cell)
<b># flora surveys / records</b>	0 (0*) surveys, 2 (0*) opportune sites, 8 (8*) Herbarium records
<b># flora in cell</b>	20 (9*)
<b># conservation rated flora in cell</b>	1 (0*)
<b># non-indigenous flora in cell</b>	0 (0*)

## Cell Descriptions – EP 5 Eight Mile Creek

<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	17.08 % of the vegetation in the cell was within an aquatic reserve in 2011, this has now been replaced by a sanctuary zone within the Upper Spencer Gulf MP

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

No weed species recorded in 2011 or 2019 GIS data.

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia burkittii</i>	Pin-bush Wattle		
<i>Acacia ligulata</i>	Umbrella Bush		
<i>Acacia oswaldii</i>	Umbrella Wattle		
<i>Acacia papyrocarpa</i>	Western Myall		
<i>Cratystylis conocephala</i>	Bluebush Daisy		
<i>Eremophila alternifolia</i>	Narrow-leaf Emubush		
<i>Erodiohyllum elderi</i>	Koonamore Daisy		
<i>Frankenia sessilis</i>	Small-leaf Sea-heath		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Olearia pimeleoides</i>	Pimelea Daisy-bush		
<i>Orobanche cernua var. australiana</i>	Australian Broomrape		R
<i>Osteocarpum salsuginosum</i>	Inland Bonefruit		
<i>Rhagodia parabolica</i>	Mealy Saltbush		
<i>Salicornia blackiana</i>	Thick-head Samphire		
<i>Senecio spanomerus</i>			
<i>Suaeda australis</i>	Austral Seablite		
<i>Tecticornia arbuscula</i>	Shrubby Samphire		
<i>Tecticornia halocnemoides ssp. longispicata</i>	Grey Samphire		
<i>Tecticornia moniliformis</i>			
<i>Wilsonia humilis</i>	Silky Wilsonia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	57 (34*) recorded – 55 (33*) birds, 0 (0*) reptiles, 0 (0*) butterflies, 1 (0*) mammals, 1 (1*) amphibian (an additional 16* reptiles and 19* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 31 (9*) opportune sites
<b># of threatened fauna in cell</b>	9 (2*)
<b># of non-indigenous fauna</b>	2 (2*) (an additional butterfly possible)

## Cell Descriptions – EP 5 Eight Mile Creek

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Amytornis textilis</i> (NC)	Western Grasswren		
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Aythya australis</i>	Hardhead		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Chlidonias hybrida</i>	Whiskered Tern		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus coronoides</i>	Australian Raven		
<i>Cygnus atratus</i>	Black Swan		
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Falco berigora</i>	Brown Falcon		
<i>Fulica atra</i>	Eurasian Coot		
<i>Gavialis virescens</i>	Singing Honeyeater		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Himantopus leucocephalus</i>	White-headed Stilt		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Lalage tricolor</i>	White-winged Triller		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus lamberti</i>	Variegated Fairywren		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Megalurus gramineus</i>	Little Grassbird		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Oreoica gutturalis</i>	Crested Bellbird		

Cell Descriptions – EP 5 Eight Mile Creek

Species	Common Name	Aus status	SA status
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon ariel</i>	Fairy Martin		
	Scarlet Robin (SE, MLR, FR, EP)		R
<i>Phaps chalcoptera</i>	Common Bronzewing		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Porzana fluminea</i>	Australian Crake (Australian Spotted Crake)		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Stictonetta naevosa</i>	Freckled Duck		V
<i>Strepera versicolor</i>	Grey Currawong		ssp
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Todiramphus sanctus</i>	Sacred Kingfisher		
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

**Butterflies**

Species	Common Name	Status*	Record
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.



## Cell Descriptions – EP 5 Eight Mile Creek

### Mammals

Species	Common Name	Aus status	SA status
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Gebyra variegata</i>	Tree Dtella			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lerista edwardsae</i>	Myall Slider			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pseudonaja affinis</i>	Dugite			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

Species	Common Name	Aus status	SA status
<i>Limodynastes tasmaniensis</i>	Spotted Marsh Frog		

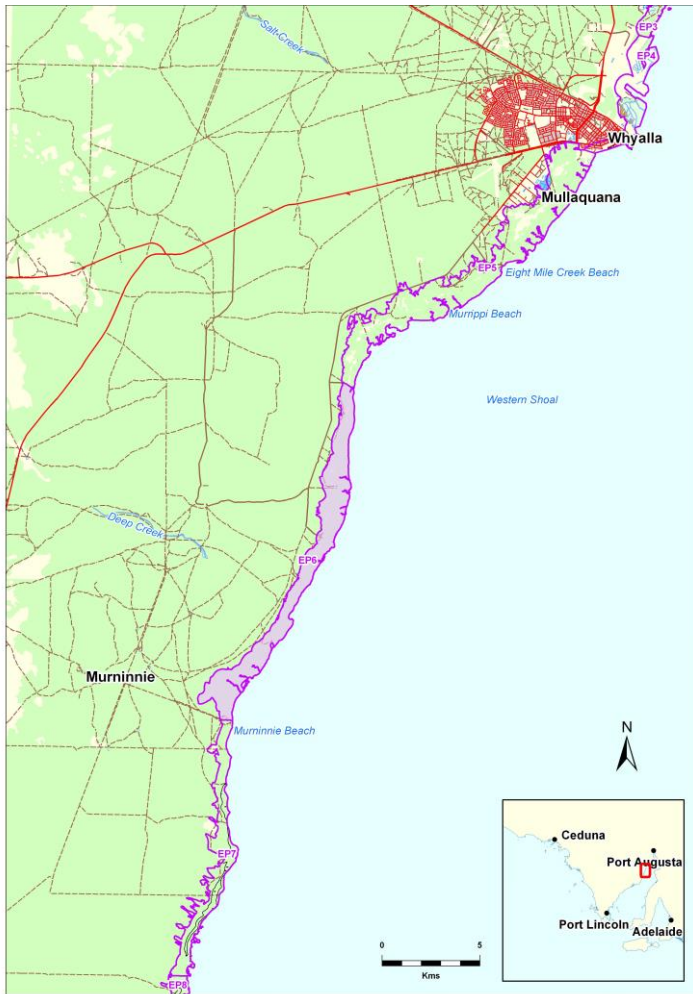
R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

### Fresh water fish

Four species of Actinopteri (gobies, hardyheads) are recorded in 2019 data.

**Cell EP 6 Murninnie Beach**

Cell area 1837.13 ha. Shoreline length 31 km.



Landforms

This low coastal plain is almost entirely mid-tide level and subject to tidal inundation. The cell is largely samphire saltmarsh, with frequent beach ridges and cheniers; these ridges are frequently cut by short tidal channels. This is an accretionary coastline, built during the Holocene from calcareous marine sands, and terrestrial clays and silt. Beach ridges appear as small sand spits, suggesting sediment drift from the south, with continued onshore accretion. The shore is, in large part, mangroves behind extensive low-tide sand and inter-tidal seagrass. There is also a short stretch of narrow high-tide reflective beach, composed of sand and shellgrit and fronted by sand flats.

Benthic Habitat

Bare sand inshore, then medium to dense seagrass to 5 km offshore.

Biota

Remnant vegetation covers an area of 1809.72 ha, 98% of the cell. There are

five herbarium flora record sites and one opportune fauna survey site within this cell. Low open chenopod shrubland and samphire on the supratidal areas: *Maireana oppositifolia*, +/-*Tecticornia indica* ssp. low open shrubland over +/-*Disphyma crassifolium* ssp. *clavellatum*, +/-*Frankenia sessili*. Samphire low shrubland on the intertidal areas: *Tecticornia arbuscula*, +/-*Sarcocornia quinqueflora*, +/-*Lycium australe* low shrubland over +/-*Suaeda australis*. Narrow strips of mangrove line most of the shore: *Avicennia marina* ssp. *marina* low open forest over +/-*Tecticornia* sp., +/-*Sarcocornia quinqueflora* shrubs. Various shrub associations are found on stranded beach ridges and chenier ridges, including *Nitraria billardeirei*, *Maireana oppositifolia*, *Atriplex vesicaria*, and *Melaleuca pauperiflora* shrublands.

Land Use/ Land Ownership

Traditional lands of the Barngarla People.

Much of the cell (67 %) covering 1233 ha is under Crown land leasehold; the northern 3 km of the cell is unalienated Crown land.



**FIGURE 6.62 Murninnie Beach. Photo: Coast Protection Board, 2018**

Uses (Field visits and local reports)

Agriculture – Grazing (Sheep).

Commercial fishing – Marine scale fish, prawns, charter fishing.

Recreation & Tourism – Sightseeing, nature, hiking, swimming, fishing, cockling, camping (informal), horse riding, dog walking, ORV use (four-wheel drive, motorbike), Murriippi Nudist Beach, boating.

Boat launching – Beach launching.

Values (Field visits and local reports)

Conservation – Cell comprises important coastal habitat: temperate coastal saltmarsh, seagrass, mudflats, sandflats, samphire, mangroves: important habitat for shorebirds and nursery for fish and invertebrates.

Threats (Field visits and local reports)

Agriculture – Grazing.

Uncontrolled access - Extensive ORV activity in the inter- and supra-tidal saltmarsh causing destruction of vegetation; informal camping; firewood collection; track creation; disturbance of shorebirds.

Feral animals – Foxes, cats, rabbits.

Weed infestation.

Opportunities (Field visits and local reports)

Coastal management plans could be implemented by DEW, EP Landscape Board and private landowners, with particular emphasis on pest plant and animal control and access control.

## Cell Descriptions – EP 6 Murninnie Beach

This cell has a large area of the EPBC listed ecological community Subtropical and Temperate Coastal Saltmarsh so there needs to be an emphasis by land managers on improving the health of this system (including the provision of the opportunity for the vegetation type to retreat with projected sea level rise).

Biological surveys currently don't reflect non-indigenous fauna species reports. Investigate opportunities for biological surveys to increase the understanding of native and non-native flora and fauna that occurs in this area.

### Conservation Analysis (GIS)

Cell EP6 has a total of conservation means of 81.89, a low priority, almost identical with the adjacent cell EP5. The mangroves, supra-tidal samphire and sabkha areas that make up 86% of the area of the cell have low totals; the intertidal samphire and beach ridges show low-medium totals. No parts of the cell record medium or higher totals. Vegetation metrics (shape, size and connectivity), viewshed and butterfly habitat contribute high scores to the total; number of threatened birds (mangroves) and reptiles (cheniers and supra-tidal samphire), Pied Oystercatcher habitat (inter-tidal samphire and mangroves), viewscape and wetland significance contribute moderate values. This low valuation of the saltmarsh reflects its lack of threatened species and communities and diversity of species, but does not reflect its valuable ecological connection with the nearshore environment; this is a significant under-valuation for this cell.

The 2019 review showed an increase of two additional native flora species recorded since the 2011 data, bringing the total number of species from six records in 2011 to eight records by 2019. The 2019 review showed an increase of two additional native fauna species that were recorded since the 2011 data, however, the total number of species remains unchanged by 2019. This can be explained as two flora species that were recorded as occurring in 2011 have since been removed in a BDBSA data update process (e.g. they may have been considered unreliable) and thus only 13 are listed as occurring in 2011 in the table below. If the analysis were repeated for this cell it is unlikely that the conservation rating of the cell would have changed.

### Threat Analysis (GIS)

Threat summary layers total 41.432, medium for the region. There is spatial variation in totals, with medium-high values on beach ridges, some supratidal areas, and near Murninnie Beach; generally, mangroves have low threat totals. Main threat totals accrue from land ownership and land use, viewshed, viewscape, and mining leases. ORV activity is mapped at the northern and southern ends of the cell.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, which may also have increased the vegetation degradation. There are local reports of weed infestations and feral animal species, but these have not been recorded within the Biological Database of SA and therefore would not impact on the GIS analysis. Overall, it is unlikely that the score would have changed sufficiently to increase the threat rating from medium.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

## Cell Descriptions – EP 6 Murninnie Beach

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Local beach recession and beach ridge instability due to foredune damage; More frequent and longer tidal flooding of saltmarsh leading to species change and changes in species distribution.	Establish a profile line to monitor for salt marsh change; Consider possible retreat buffer zones for tide-dependant ecosystems - re-zoning on land use and development plans needed.	
2070: +c.80cm	Migration of mangroves and samphire in response to changing tide heights; Continuation of current sediment accretion (and mangrove colonisation) is uncertain.	Ensure circulation of tidal waters to saltmarsh.	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes.	Continue to monitor shoreline movement and salt marsh boundaries; Active management of dune.	
<b>Warmer average conditions:</b> 2030:+0.3 to.6°C 2070:+1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Habitats (on beach ridges and cheniers) adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Monitor habitat change, as part of saltmarsh monitoring.	
<b>Groundwater lowering; saline incursion:</b>	Groundwater already saline in this cell. Tidal creek flow within salt marsh essential to samphire survival.	Ensure tidal creek flow within saltmarsh is maintained.	

## Cell Descriptions – EP 6 Murninnie Beach

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement; Continuing near shore supply of biogenic (calcareous) sands uncertain because of increasing ocean acidity.		

**TABLE 6.58 Recommended Actions and Priority for EP6 Murninnie Beach**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.)	Medium (cons/threat)	EP Landscape Board, Whyalla City Council, community
	Very inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DEW, EP Landscape Board
	Ongoing and accelerating sea level beginning to cause change in beach ridges, cheniers and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board

## Cell Descriptions – EP 6 Murninnie Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
	Extensive impact of ORV within the saltmarsh with destruction of plant species within the supra- and inter-tidal zones.	Develop access management plan, including review of existing access with a view to rationalise unnecessary tracks and car parks; Block access (e.g. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain; Install directional/ educational signage; Community education.	High (cons/threat)	EP Landscape Board, Whyalla City Council, community, Tourism SA
Mangrove and Saltmarsh	Tide-dependant mangrove and samphire are critically affected by continuing and accelerating sea level rise leading to change in frequency and height of tidal flooding; they need space to retreat and accommodate this change. Potentially resulting in loss of seagrass offshore and loss of fish.	Establish a saltmarsh profile to monitor change (including sedimentation rates), and improve flora mapping to be used as a basis for adaptive management.	High (cons/threat)	DEW, EP Landscape Board
	Possible future development within areas that could be used to allow saltmarsh retreat with rising sea levels.	Modify land use and development plans to create buffer zone for saltmarsh retreat.	High (cons/threat)	DEW, DPC Planning, EP Landscape Board, Whyalla City Council
	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (hazard)	Whyalla City Council, DEW, developers, landowners.

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	1809.72 ha (98.51 % of the cell)
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## Cell Descriptions – EP 6 Murninnie Beach

<b># flora surveys / records</b>	0 (0*) surveys, 0 (0*) opportune sites, 5 (6*) Herbarium records
<b># flora in cell</b>	8 (6*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	0 (0*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

No weed species recorded in 2011 or 2019 GIS data.

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia ancistrophylla</i> var. <i>lissophylla</i>	Hook-leaf Wattle		
<i>Acacia ligulata</i>	Umbrella Bush		
<i>Acacia notabilis</i>	Notable Wattle		
<i>Atriplex stipitata</i>	Bitter Saltbush		
<i>Gelidium pusillum</i>			
<i>Goodenia varia</i>	Sticky Goodenia		
<i>Olearia pimeleoides</i>	Pimelea Daisy-bush		
<i>Tecticornia halocnemoides</i> ssp. <i>halocnemoides</i>	Grey Samphire		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	15 (15*) recorded – 15 (14*) birds, 0 (0*) reptiles, 0 (0*) butterflies, 0 (1*) mammals, 0 (0*) amphibian (an additional 16* reptiles and 25* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 1 (1*) opportune site
<b># of threatened fauna in cell</b>	1 (1*)
<b># of non-indigenous fauna</b>	2 (2*) (an additional butterfly possible)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

## Cell Descriptions – EP 6 Murninnie Beach

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Dicaeum hirundinaceum</i>	Mistletoebird		
<i>Falco longipennis</i>	Australian Hobby		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Melopsittacus undulatus</i>	Budgerigar		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

No butterfly species recorded in 2019 data.

Species	Common Name	Status*	Record
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Geitoneura kelugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p

## Cell Descriptions – EP 6 Murninnie Beach

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Vanessa itea</i>	Australian Admiral	LU	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammal species recorded in 2019 data.

Species	Common Name	Aus status	SA status
<i>Cercartetus concinnus</i>	Western Pygmy-possum		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

### Reptiles

No reptile species recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Gehyra variegata</i>	Tree Dтеля			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lerista edwardsae</i>	Myall Slider			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pseudonaja affinis</i>	Dugite			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2019 data or 2011 data.

**Cell EP 7 Munyaroo Conservation Park**

Cell area 974.83 ha. Shoreline length 18.2 km.



Landforms

A low lying coastal plain extending 18km from Plank Point to Murninnie Beach: it is a constructive coast with low Holocene barrier sands trapping flood prone saltmarsh flats. The beach is narrow, reflective, low energy, sand and shellgrit, fronted by extensive low tide sand flats and backed by beach ridges and patches of samphire. The shallow nearshore sand flats, c.1 km wide, are in places colonised by samphire and, towards the northern end of the cell, mangrove. There are sub-parallel ridges of low Holocene dunes running in from the shoreline. Behind the beach ridges, there are low-lying areas, with storm surge hazard in the extreme south. The serrated inner boundary of the coastal zone follows around the perimeter of the Pleistocene red sand parallel sand ridges; in the inter-dunal corridors some stranded inter-tidal samphire has been mapped. The numerous low Holocene beach

ridges are discussed in detail in Short et al 1986, pp.57, 58, and figs 4.2 and 4.3 illustrate their relationship to the Pleistocene dunes and date their accumulation over the last 2,700 years. The serrated inner coastal zone boundary reflects the pattern of Pleistocene (linear NW - SE) red quartz dunes (Sprigg, 1979), with coastal storm surge floodable land in the inter-dunal corridors. Re-working of these Pleistocene quartz dunes that formerly extended across the Gulf floor, to beach ridges at the end of the Holocene transgression, has resulted in a mixed shell (Holocene) and mineral (Pleistocene) composition for the ridges.

Benthic Habitat

Bare sand inshore to c.700 m, then dense seagrass.

Biota

Remnant vegetation covers an area of 946.94 ha, 97% of the cell. There are six flora survey sites, one opportune flora survey site, two fauna survey sites and 25 opportunistic fauna survey sites within this cell – all within the conservation park. The dune crests are often capped with *Eucalyptus incrassata* mid mallee woodland over *Melaleuca uncinata*, *Leptospermum coriaceum* mid shrubs over *Calytrix involucreta* low shrubs over +/- *Schoenus racemosus*, +/- *Triodia lanata*; within the

## Cell Descriptions – EP 7 Munyaroo Conservation Park

dunes *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Tbrelkeldia diffusa*, *Tetragonia implexicoma*, *Rbagodia candolleana* ssp. *Candolleana* is also found, together with *Pimelea serpyllifolia* ssp. *serpyllifolia* low shrubs. Landward of the dunes there is *Tecticornia* sp. low sparse shrubland over *Disphyma crassifolium* ssp. *Clavellatum* and saline flats in the intertidal areas. On the sandy slopes there is *Melaleuca lanceolata*, +/- *Olearia axillaris*, +/- *Leucopogon parviflorus* tall open shrubland and *Nitraria billardierei*, +/- *Olearia axillaris* mid open shrubland.

### Land Use/Land Ownership

Traditional lands of the Barngarla people.

Approximately 75% of this cell is within Munyaroo Conservation Park.

Franklin Harbor Marine Park Habitat Protection Zone offshore.



**FIGURE 6.63** Munyaroo Conservation Park. Coast Protection Board, 2018

### Uses (Field visits and local reports)

Shack settlement – Murninnie Shacks.

Conservation – Munyaroo Conservation Park.

Agriculture – Grazing (sheep).

Commercial fishing – Marine scale fish.

Recreation and Tourism – Sightseeing, nature, hiking, swimming, fishing, cockling, camping (informal), horse riding, dog walking, ORV use (four wheel drives, motorbikes), boating.

Boat launching – Beach.

### Values (Field visits and local reports)

Conservation – Temperate coastal saltmarsh, tidal creeks, mangroves, samphire, seagrass, mudflats/sandflats: important habitat for shorebirds and nursery for fish and invertebrates.

## Cell Descriptions – EP 7 Munyaroo Conservation Park

### Threats (Field visits and local reports)

Agriculture – Grazing.

Pollution – Rubbish dumping, garden waste, marine debris, dumping of cars/caravans.

Uncontrolled access – ORV use, informal camping, track creation, encroachment outside of formal camping areas, firewood collection and dogs in National Parks leading to vegetation destruction, dune erosion, disturbance of shorebirds, and fauna fatalities.

Risk to Public – Firearms, chainsaws in National Parks.

Feral animals – Foxes, cats, rabbits, goats.

Weed infestation – Garden escapees; African Boxthorn.

### Opportunities (Field visits and local reports)

Coastal management plans could be prepared and implemented by DEW, EP Landscape Board and private landowners, with particular emphasis on pest plant and animal control and access control.

This cell has a large area of the EPBC-listed ecological community Subtropical and Temperate Coastal Saltmarsh, so there needs to be an emphasis by land managers on improving the health of this system (including the provision of the opportunity for the vegetation type to retreat with projected sea level rise).

Biological surveys currently don't reflect non-indigenous fauna species reports. Investigate opportunities for biological surveys to increase the understanding of native and non-native flora and fauna that occurs in this area.

### Conservation Analysis (GIS)

The total for conservation means is 97.49, a medium total for the region. There appears to be a clear pattern of values: most totals are low to medium low, these are on the saltmarsh areas; while the dune ridges backing the beaches, and the chenier ridges show medium to medium high totals. Notable contributors to the total include: endemic coastal dune plant associations (>50% of state records), habitat for threatened bird species, significant butterfly habitat (throughout the cell, many areas have habitat for over 20 species, and notably on the open chenopod shrublands), viewshed and viewscape, and vegetation block metrics (size, shape and connectivity). There are low to moderate values for number of threatened bird species, with more on the sand dune areas; habitat for the focal species Beach Slider and the Bight Coast Skink is recorded throughout the sand dune areas.

The 2019 review showed an increase of nine additional native flora species recorded since the 2011 data, and one weed species, bringing the total number of species from 57 records to 67 records by 2019. The 2019 review showed a significant increase in fauna data with 68 additional native fauna species recorded since the 2011 analysis. Ten of the fauna records are species with a conservation rating, including the Fairy Tern *Sternula nereis*, listed as endangered under the *National Parks and Wildlife Act 1972* (NPW Act) and vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*, Painted Buttonquail, *Turnix varius*, listed as rare under the NPW Act, Freckled Duck, *Stictonetta naevosa*, listed as vulnerable under the *NPW Act*, Rock Parrot, *Neophema petrophila* and Gilbert's Whistler, *Pachycephala inornate*, White-winged Chough, *Corcorax melanorhampbos*, Musk Duck, *Biziura lobata*, the Sooty Oystercatcher, *Haematopus fuliginosus* Pied Oystercatcher *Haematopus longirostris*, all listed as rare under the NPW Act, bringing the total number of fauna species from 38 in 2011 to 100 records by 2019. Why this figure doesn't add up (i.e. 68 more than 2011) can be explained as six species that were part of the 2011 GIS have since been removed in a BDBSA data update process (e.g. they may have been considered unreliable). If the analysis were repeated for this cell, even though flora species



## Cell Descriptions – EP 7 Munyaroo Conservation Park

richness and threatened bird species has increased significantly, it is unlikely that these alone would be enough to raise the conservation rating of the cell to high.

### Threat Analysis (GIS)

The total means for threat layers is 33.040, low for the region. The detailed pattern of threats is clear: low totals for the northernmost majority of the cell in the Munyaroo Conservation Park; medium to high values in the southern one third. This concentration of threats in one part of the cell is potentially a signal for management action, since it is on sand ridges with conservation values. The main contributors to this small threat total are viewscape and viewshed, ORV (throughout the cell), mining (petroleum exploration licences - outside the park), land use and ownership (outside the park). ORV distribution raises questions that need local resolution: there are multiple tracks within the CP, though not concentrated in the more valuable parts; south of the park the priority sand dune area is tracked by ORV, though this is not extensive.

Reports that the area impacted by ORV and informal campsites has increased since 2011, with reports that this activity has resulted in increased vegetation degradation. There is one additional weed record which is a Red Alert species, Wards Weed *Carrichtera annua*. However, it is unlikely that the score would have changed sufficiently to increase the threat rating from low.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Shoreline change will depend on the local balance of erosion (through sea level rise) and continuing sediment accretion;  Areas of salt marsh will be subject to more frequent and more extensive tidal flooding. Low lying land behind dunes may become inundated as flood peaks rise with implications for the ecology of this system.	Monitor through aerial photograph time series;  Monitor the extent of tidal flooding.	
2070: +c.80cm	Locally shoreline recession and dune instability, tidal	Monitor effects of peak tides.	



Cell Descriptions – EP 7 Munyaroo Conservation Park

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	inundation, and movement further increased.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale;  <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement and saltmarsh boundaries; Active management of dunes.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses; This combination of circumstances is likely to destabilise the dunes, to transgress landwards across the saltmarsh.	Active management of dunes to slow recession and consider possible retreat buffer zones to allow for transgressive movement of sand in response to sea level rise.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes;  Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor level and salinity of water table within dunes and swamps.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.59 Recommended Actions and Priority for Cell EP 7**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (hazard)	DEW, EP Landscape Board
	Low lying areas threatened by salt water pressure on ground water tables.	Monitor	Low (hazard)	DEW
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.)	Medium (cons/threat)	EP Landscape Board, DC Franklin Harbour, community
	Inadequate data on biodiversity and habitat values including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons/threat)	DEW, EP Landscape Board
Saltmarsh	These areas are of moderate value for lizard, bird and butterfly habitat, but threatened by ORV activity.	Review the ORV track, with a view to controlling extensions.	Medium (cons/threat)	DEW, Tourism SA, DC Franklin Harbour, EP Landscape Board
Dunes and sand ridges south of the CP	Extensive ORV activity threatens samphire and dune shrubland.	The dunes show medium high conservation values and access control should be undertaken in these areas.	High (cons/threat)	DEW, Tourism SA, DC Franklin Harbour, EP Landscape Board

## Cell Descriptions – EP 7 Munyaroo Conservation Park

Component	Issue	Proposed Action	Priority of Action	Key Players
	The CP has high conservation values with impacts from recreational activities, uncontrolled access, weeds and pest animals.	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna. Update Management Plan when possible.	High (cons)	DEW

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	946.94 ha (97.14 % of the cell)
<b># flora surveys / records</b>	6 (6*) surveys, 1 (0*) opportune sites, 0 (0*) Herbarium records
<b># flora in cell</b>	67 (57*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	2 (1*)
<b>Significant CDCS floristic community</b>	<i>Melaleuca lanceolata</i> / <i>Tetragonia implexicoma</i> shrubland – 72 % of SA records in EP <i>Nitraria billardierei</i> shrubland – 54% of SA records in EP
<b>Protected area</b>	100% of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Sisymbrium erysimoides</i>	Smooth Mustard		0

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

#### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia ligulata</i>	Umbrella Bush		
<i>Acacia oswaldii</i>	Umbrella Wattle		
<i>Actinobole uliginosum</i>	Flannel Cudweed		

Cell Descriptions – EP 7 Munyaroo Conservation Park

Species	Common Name	Aus status	SA status
<i>Alyxia buxifolia</i>	Sea Box		
<i>Amyema melaleuca</i>	Tea-tree Mistletoe		
<i>Amyema miraculosa</i> ssp. <i>boormanii</i>	Fleshy Mistletoe		
<i>Atriplex paludosa</i> ssp.	Marsh Saltbush		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Austrostipa drummondii</i>	Cottony Spear-grass		
<i>Beyeria lechenaultii</i>	Pale Turpentine Bush		
<i>Calandrinia granulifera</i>	Pigmy Purslane		
<i>Calandrinia</i> sp.	Purslane/Parakeelya		
<i>Carpobrotus</i> sp.	Pigface		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Crassula</i> sp.	Crassula/Stonecrop		
<i>Cratystylis conocephala</i>	Bluebush Daisy		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus gracilis</i>	Yorrell		
<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath		
<i>Frankenia</i> sp.	Sea-heath		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Hemichroa diandra</i>	Mallee Hemichroa		
<i>Lasiopetalum behrii</i>	Pink Velvet-bush		
<i>Lawrenzia squamata</i>	Thorny Lawrenzia		
<i>Leptospermum coriaceum</i>	Dune Tea-tree		
<i>Lichen</i> sp.			
<i>Lomandra effusa</i>	Scented Mat-rush		
<i>Lycium australe</i>	Australian Boxthorn		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Maireana oppositifolia</i>	Salt Bluebush		
<i>Maireana trichoptera</i>	Hairy-fruit Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree		
<i>Millotia perpusilla</i>	Tiny Bow-flower		
<i>Myoporum insulare</i>	Common Boobialla		
<i>Myoporum platycarpum</i> ssp.	False Sandalwood		
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia muelleri</i>	Mueller's Daisy-bush		
<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podolepis capillaris</i>	Wiry Podolepis		
<i>Ptilotus obovatus</i> (NC)	Silver Mulla Mulla		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Rhagodia crassifolia</i>	Fleshy Saltbush		
<i>Rhagodia preissii</i> ssp. <i>preissii</i>	Mallee Saltbush		
<i>Roepera similis</i>	White Twinleaf		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Santalum acuminatum</i>	Quandong		

## Cell Descriptions – EP 7 Munyaroo Conservation Park

Species	Common Name	Aus status	SA status
<i>Scaevola spinescens</i>	Spiny Fanflower		
<i>Sclerolaena diacantha</i>	Grey Bindyi		
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Senecio sp.</i>	Groundsel		
<i>Tecticornia arbuscula</i>	Shrubby Samphire		
<i>Tecticornia halocnemoides ssp. halocnemoides</i>	Grey Samphire		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Thryptomene micrantha</i>	Ribbed Thryptomene		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Fauna

# of fauna in cell	100 (38*) recorded – 83 (21*) birds, 9 (9*) reptiles, 0 (0*) butterflies, 8 (8*) mammals, 0 (0*) amphibian
# of fauna surveys / records	2 (2*) survey sites, 25 (14*) opportune sites
# of threatened fauna in cell	10 (0*)
# of non-indigenous fauna	5 (5*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Felis catus</i>	Domestic Cat (Feral Cat)	Mammalia	
<i>Mus musculus</i>	House Mouse	Mammalia	
<i>Oryctolagus cuniculus</i>	Rabbit (European Rabbit)	Mammalia	
<i>Vulpes vulpes</i>	Fox (Red Fox)	Mammalia	

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		
<i>Anthochaera carunculata</i>	Red Wattlebird		
<i>Anthus australis</i>	Australian Pipit		
<i>Aphelocephala leucopsis</i>	Southern Whiteface		

Cell Descriptions – EP 7 Munyaroo Conservation Park

Species	Common Name	Aus status	SA status
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Artamus cinereus</i>	Black-faced Woodswallow		
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Biziura lobata</i>	Musk Duck		R
<i>Cacomantis pallidus</i>	Pallid Cuckoo		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Chalcites basalus</i>	Horsfield's Bronze Cuckoo		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chenonetta jubata</i>	Maned Duck		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cinclosoma castanotum</i> (NC)	Chestnut-backed Quailthrush (Chestnut Quailthrush)		ssp
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corcorax melanorhombos</i>	White-winged Chough		R
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Cygnus atratus</i>	Black Swan		
<i>Daphoenositta chrysoptera</i>	Varied Sittella		
<i>Dicaeum hirundinaceum</i>	Mistletoebird		
<i>Dromaius novaehollandiae</i>	Emu		
<i>Drymodes brunneopygia</i>	Southern Scrub Robin		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Eopsaltria griseogularis</i>	Western Yellow Robin		
<i>Epthianura aurifrons</i>	Orange Chat		
<i>Falco berigora</i>	Brown Falcon		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavialis virescens</i>	Singing Honeyeater		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Malurus cyanus</i>	Superb Fairywren		
<i>Malurus leucopterus</i>	White-winged Fairywren		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Malurus splendens callainus</i>	Turquoise Fairywren		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Melanodryas cucullata</i>	Hooded Robin		ssp
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Oreoica gutturalis</i>	Crested Bellbird		
<i>Pachycephala inornata</i>	Gilbert's Whistler		R
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Pachycephala rufiventris</i>	Rufous Whistler		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon nigricans</i>	Tree Martin		

## Cell Descriptions – EP 7 Munyaroo Conservation Park

Species	Common Name	Aus status	SA status
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Psephotellus varius</i>	Mulga Parrot		
<i>Purnella albifrons</i>	White-fronted Honeyeater		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis</i>	White-browed Scrubwren		
<i>Smicromis brevirostris</i>	Weebill		
<i>Sternula nereis</i>	Fairy Tern	V	E
<i>Stictonetta naevosa</i>	Freckled Duck		V
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Turnix varius</i>	Painted Buttonquail		R
<i>Vanellus miles</i>	Masked Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

No butterfly species recorded in 2019 data or 2011 data.

### Mammals

Species	Common Name	Aus status	SA status
<i>Macropus (Osphranter) robustus</i>	Euro		
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		
<i>Macropus sp.</i>			
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			
<i>Ctenophorus fordi</i>	Mallee Dragon			
<i>Ctenophorus pictus</i>	Painted Dragon			
<i>Ctenotus schomburgkii</i>	Sandplain Ctenotus			



## Cell Descriptions – EP 7 Munyaroo Conservation Park

Species	Common Name	Aus status	SA status	Record
<i>Demansia reticulata</i>	Desert Whipsnake			
<i>Eremiascincus richardsonii</i>	Broad-banded Sandswimmer			
<i>Lerista edwardsae</i>	Myall Slider			
<i>Morethia adelaidensis</i>	Adelaide Snake-eye			
<i>Pogona vitticeps</i>	Central Bearded Dragon			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### **Amphibians**

No amphibian species recorded in 2019 data or 2011 data.

## Cell EP 8 Munyaroo Conservation Reserve

Cell area 3289.5 ha. Shoreline length 47.4 km.



### Landforms

This large cell comprises a low coastal plain of mixed saltmarsh, beach ridges and sand flats, extending from Shoalwater Point to Plank Point; beaches and beach ridges are largely constructed from shellgrit. There are extensive sandflats nearshore, reflecting the large amounts of sediment accumulating at this low energy coast; in the southern half of the cell coastline advance appears to be taking place as nearshore accumulation is colonised by mangroves or saltmarsh, and joined to begin a new beach ridge. The numerous low Holocene beach ridges are discussed in detail in Short et al (1986, pp.57-58), and Figures 4.2 and 4.3 illustrate their relationship to the Pleistocene dunes and date their accumulation over the last 2,700 years. The serrated inner coastal zone boundary reflects the pattern of Pleistocene (linear NW - SE) red quartz dunes (Sprigg, 1979), with coastal storm surge floodable land in the inter-dunal

corridors. Re-working of these Pleistocene quartz dunes that formerly extended across the Gulf floor, to beach ridges at the end of the Holocene transgression, has resulted in a mixed shell and mineral composition for the ridges.

### Benthic Habitat

Below low tide there is bare sand to c.500 m, then dense seagrass.

### Biota

Remnant vegetation covers an area of 3290 ha, 99% of the cell. There are two flora survey sites, two herbarium flora record sites, three opportune flora record sites, two fauna survey sites and four opportune fauna survey sites (located near Shoalwater Point). 67% of the cell is saltmarsh and mangrove. The saltmarsh is described as *Tecticornia sp.* low sparse shrubland over *Disphyma crassifolium ssp. Clavellatum*; while the beach and chenier ridges show *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa*, *Tetragonia implexicoma*, *Rhagodia candolleana ssp. candolleana*, *Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa*, *Dianella brevicaulis*, *Carpobrotus rossii*, *Clematis microphylla var. microphylla*, *Senecio pinnatifolius*.

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

### Land Use/Land Ownership

Traditional lands of the Barngarla people.

34% of this cell is within the Munyaroo Conservation Park (CP), formally a Conservation Reserve. On 20 August 2009, the Munyaroo Conservation Reserve, dedicated as a conservation reserve on 11 November 1993 under the state's *Crown Lands Act 1929* was added to the conservation park. 48% of the coastal land is Crown leasehold land, including a Heritage Agreement over 3.7km (12%) of the coastal strip immediately SW of the CR. A series of Heritage Agreements in the immediate hinterland of the coast strengthen the value of these two reserves.

Franklin Harbor Marine Park Habitat Protection Zone offshore.



**FIGURE 6.64** Munyaroo Conservation Reserve. Coast Protection Board, 2018

### Uses (Field visits and local reports)

Conservation – Munyaroo Conservation Park.

Agriculture – Grazing (sheep).

Commercial fishing – Marine scale fish, charter fishing, abalone.

Recreation and Tourism – Sightseeing, nature, hiking, recreational fishing, cockling, camping (informal), ORV use (four-wheel drives, motorbikes), boating.

Boat launching – Beach.

Submarine cable and pipeline at Shoalwater Point.

### Values (Field visits and local reports)

Tidal Creeks, mangroves, samphire, mudflats/sandflats, seagrass, subtidal reef, rare stony coral, beach.

Conservation – temperate coastal saltmarsh: important habitat for shorebirds and nursery for fish and invertebrates.

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

### Threats (Field visits and local reports)

Agriculture – Grazing.

Pollution – Marine debris, dumping of cars/caravans.

Uncontrolled access – ORV use, informal camping, track creation, encroachment outside of formal camping areas, firewood collection leading to vegetation destruction, dune erosion, disturbance of shorebirds.

Feral animals – Foxes, Cats, Rabbits, Goats.

Weed infestation – African Boxthorn.

### Opportunities (Field visits and local reports)

Coastal management plans could be prepared and implemented by DEW, EP Landscape Board and private landowners, with particular emphasis on pest plant and animal control and access control.

This cell has a large area of the EPBC-listed ecological community Subtropical and Temperate Coastal Saltmarsh, so there needs to be an emphasis by land managers on improving the health of this system (including the provision of the opportunity for the vegetation type to retreat with projected sea level rise).

Biological surveys currently don't reflect non-indigenous fauna species reports. Investigate opportunities for biological surveys to increase the understanding of native and non-native flora and fauna that occurs in this area.

### Conservation Analysis (GIS)

Although the total for this cell is medium, 99.26, other than a small area of sand dune south of Plank Point, no individual part of the cell shows higher than low medium totals for any location. Generally, beach ridges and cheniers show higher totals than saltmarsh. Layers making notable contribution to the total include: wetland significance, vegetation metrics (including shape, size and connectivity), viewshed, endemic plant associations (some *Olearia axillaris* associations on sand dunes and ridges), habitat of threatened bird species (saltmarsh swamp areas), threatened reptile species and threatened mammal species, also butterfly habitat. The dune area south of Plank Point stands out as a habitat for threatened reptile species including focal species, Beach Slider and Bight Coast Skink, and habitat of mammal species.

The 2019 review showed an increase of eight additional native flora species recorded since the 2011 data, and seven weed species, bringing the total number of species from 75 records to 87 records by 2019. The table shows only 72 records from 2011 the analysis in the table which can be explained as three records have since been removed in a BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of eight additional native fauna species recorded since the 2011 analysis bringing the total of fauna species records to 16 compared with 10 in 2011. Two of the fauna records are species with a conservation rating, including the Fairy Tern *Sternula nereis* listed as Endangered under the *National Parks and Wildlife Act 1972* (NPW Act) and vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* the Pied Oystercatcher *Haematopus longirostris* listed as rare under the NPW Act. This brings the total number of fauna species from ten to 16 records by 2019. Why this figure doesn't add up can be explained as two species that were part of the 2011 GIS have, again, since been removed in a BDBSA data update process. If the analysis were repeated for this cell, even though flora species richness and threatened bird species has increased, it is unlikely that these alone would be enough to raise the conservation rating of the cell to high.

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

### Threat Analysis (GIS)

The total of threat scores is a medium one for the region, 43.735. The distribution of total detailed threat scores shows a striking local contrast: south of the southern perimeter of the heritage agreement land threat scores total high to medium high values; north of this line they are medium low to low. The main contributors to the threat total are land ownership and land use, vegetation block degradation, distribution of dangerous weeds and viewshed. Dangerous weeds are mapped in the centre of the cell coastline, through CP, heritage agreement and Crown leasehold land alike: bearing in mind the broad conservation designations of lands in this locality, this appears significant. Off road tracks were not over dominant in this cell in 2011 and appear through all types of landholding.

In the 2019 review, impacts from ORVs and informal camping and track creation were highlighted as land management issues and there are seven additional weed records including one additional Red Alert and one Declared weed species since the 2011 analysis. However, it is unlikely that the score would have changed sufficiently to increase the threat rating from medium to high. The regazetting of the CR to a CP has not impacted on the threat score as CP's and CR's were both allocated a 0 threat rating in the 2011 analysis anyway.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility; Tidal flooding of saltmarsh in the north of the cell becomes more frequent and of greater duration, leading to samphire community change, and possible mangrove and samphire migration.	Active management of dunes to slow recession and consider possible retreat buffer zones to allow for transgressive movement of sand in response to sea level rise; Consider possible retreat buffer zones for tide-dependant ecosystems - re-zoning on land use and development plans needed.	

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm	Dune instability and movement further increased; Migration of mangroves and intertidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement and salt marsh boundaries in order to manage adaptively; Active management of dunes.	
<b>Warmer average conditions:</b> 2030:+0.3 to.6°C 2070:+1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes; Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.60 Recommended Actions and Priority for EP8 Munyaroo CR**

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	African boxthorn mapped in several locations, and notably in the Crown leasehold land. Aleppo pine mapped within the CP.	Weed management plan to control the spread of this dangerous weed.		DEW, EP Landscape Board
	Tide-dependant mangrove and saltmarsh need space to retreat with sea level rise.	Monitor saltmarsh change through the establishment of a profile survey line; Investigate opportunities to modify land use and development plans to create buffer zone for saltmarsh retreat (in accordance with EP regional plans).	Medium (local saltmarsh habitat values are low); Medium (cons/threat)	DEW, EP Landscape Board, DC Franklin Harbour
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc).	Medium (cons/threat)	EP Landscape Board, DC Franklin Harbour, community
	Inadequate data on biodiversity and habitat values, particularly fauna surveys, as pest fauna are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons/threat)	DEW, EP Landscape Board



## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

Component	Issue	Proposed Action	Priority of Action	Key Players
Conservation Park	The CP as high conservation values with impacts from recreational activities, uncontrolled access, weeds and pest animals.	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna. Update Management Plan when Possible.	High (cons)	DEW

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	3298.50 ha (98.9% of the cell)
<b># flora surveys / records</b>	2 (2*) surveys, 3 (0*) opportune sites, 2 (4*) Herbarium records
<b># flora in cell</b>	87 (75*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	19 (12*)
<b>Significant CDCS floristic community</b>	<i>Melaleuca lanceolata</i> / <i>Tetragonia implexicoma</i> shrubland – 72% of SA records in EP
<b>Protected area</b>	47.07 % of the vegetation is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bupleurum semicompositum</i>	Hare's Ear		0
<i>Carduus tenuiflorus</i>	Slender Thistle	D	2
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Carthamus lanatus</i>	Saffron Thistle		-
<i>Dittrichia graveolens</i>	Stinkweed		-
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Medicago minima</i>	Little Medic		1
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Oenothera stricta ssp. stricta</i>	Common Evening Primrose		0
<i>Oligocarpus calendulaceus</i>			0
<i>Onopordum acanthium</i>	Scotch Thistle		-

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

Species	Common Name	Status	Study rating
<i>Pinus halepensis</i>	Aleppo Pine	D, RA	5
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Schismus barbatus</i>	Arabian Grass		0
<i>Sisymbrium erysimoides</i>	Smooth Mustard		0
<i>Solanum nigrum</i>	Black Nightshade		2
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Alyxia buxifolia</i>	Sea Box		
<i>Amyema miraculosa ssp. boormanii</i>	Fleshy Mistletoe		
<i>Atriplex acutibractea ssp. acutibractea</i>	Pointed Saltbush		
<i>Atriplex paludosa ssp. cordata</i>	Marsh Saltbush		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Austrostipa drummondii</i>	Cottony Spear-grass		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Austrostipa exilis</i>	Heath Spear-grass		
<i>Austrostipa nitida</i>	Balcarra Spear-grass		
<i>Austrostipa sp.</i>	Spear-grass		
<i>Brachyscome ciliaris var. ciliaris</i>	Variable Daisy		
<i>Brachyscome lineariloba</i>	Hard-head Daisy		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Calandrinia sp.</i>	Purslane/Parakeelya		
<i>Calandrinia volubilis</i>	Twining Purslane		
<i>Calotis erinacea</i>	Tangled Burr-daisy		
<i>Carpobrotus sp.</i>	Pigface		
<i>Chenopodium curvispicatum</i>	Cottony Goosefoot		
<i>Chenopodium desertorum ssp. desertorum</i>	Frosted Goosefoot		
<i>Crassula colorata var. acuminata</i>	Dense Crassula		
<i>Crassula sieberiana ssp. tetramera (NC)</i>	Australian Stonecrop		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface		
<i>Dodonaea viscosa ssp. angustissima</i>	Narrow-leaf Hop-bush		
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush		
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush		
<i>Enneapogon nigricans</i>	Black-head Grass		
<i>Eremophila deserti</i>	Turkey-bush		
<i>Eremophila oppositifolia ssp. oppositifolia</i>	Opposite-leaved Emubush		
<i>Eucalyptus gracilis</i>	Yorrell		
<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee		
<i>Eucalyptus rugosa</i>	Coastal White Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Frankenia pauciflora var. gunnii</i>	Southern Sea-heath		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Hemichroa diandra</i>	Mallee Hemichroa		
<i>Lichen sp.</i>			

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

Species	Common Name	Aus status	SA status
<i>Lycium australe</i>	Australian Boxthorn		
<i>Maireana brevifolia</i>	Short-leaf Bluebush		
<i>Maireana cannonii</i>	Cannon's Bluebush		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Maireana trichoptera</i>	Hairy-fruit Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Moss sp.</i>			
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Osteocarpum salsuginosum</i>	Inland Bonefruit		
<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podolepis capillaris</i>	Wiry Podolepis		
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush		
<i>Rhagodia crassifolia</i>	Fleshy Saltbush		
<i>Rhagodia preissii ssp. preissii</i>	Mallee Saltbush		
<i>Roepora similis</i>	White Twinleaf		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Rytidosperma sp.</i>	Wallaby-grass		
<i>Scaevola spinescens</i>	Spiny Fanflower		
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
<i>Senecio glossanthus (NC)</i>	Annual Groundsel		
<i>Senecio pinnatifolius (NC)</i>	Variable Groundsel		
<i>Suaeda australis</i>	Austral Seablite		
<i>Tecticornia arbuscula</i>	Shrubby Samphire		
<i>Tecticornia halocnemoides ssp. halocnemoides</i>	Grey Samphire		
<i>Tecticornia moniliformis</i>			
<i>Tecticornia tenuis</i>	Slender Samphire		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Vittadinia cervicalaris var. cervicalaris</i>	Waisted New Holland Daisy		
<i>Wilsonia humilis</i>	Silky Wilsonia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	16 (10*) recorded – 16 (10*) birds, 0 (0*) reptiles, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian
<b># of fauna surveys / records</b>	2 (0*) survey sites, 4 (1*) opportune sites
<b># of threatened fauna in cell</b>	2 (0*)
<b># of non-indigenous fauna</b>	0 (0*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

No non-indigenous fauna species recorded in 2019 or 2011 data.

## Cell Descriptions – EP 8 Munyaroo Conservation Reserve

### Birds

Species	Common Name	Aus status	SA status
<i>Anthus australis</i>	Australian Pipit		
<i>Artamus cinereus</i>	Black-faced Woodswallow		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus sp.</i>	crows		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Malurus leucopterus</i>	White-winged Fairywren		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Sternula nereis</i>	Fairy Tern	V	E
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

No butterfly species recorded in 2019 data or 2011 data.

### Mammals

No mammal species recorded in 2019 or 2011 data.

### Reptiles

No reptile species recorded in 2019 or 2011 data.

### Amphibians

No amphibian species recorded in 2019 or 2011 data.

**Cell EP 11 Port Gibbon**

Cell area 429.3 ha. Shoreline length 8.3 km.



Landforms

This cell comprises an undulating coastal plain of red Pleistocene clays and sands, with beaches, narrow to absent dunes and low eroding red alluvial cliffs. The beaches are coarse sand, reflective, with low wave energy. However, they are south-facing and are affected by occasional storm wave conditions. South-west (SW) of Port Gibbon, the narrow beach is fronted by reefs and platforms and backed by a low, red alluvial bluff. Approximately 2 km of low, red alluvial bluff is also found immediately east of Port Gibbon. Gibbon Point, at the SW end of the cell, and The Knob, at the eastern end of the cell, are underlain by pre-Cambrian sedimentary and metamorphic rocks: sandstones and gravels. The dunes are narrow, low and located along the tops of the soft red cliffs; they widen to 200 m at the eastern end of the cell.

Benthic Habitat

National benthic mapping reports bare sand offshore, except for a narrow inshore reef along the SW half of the cell between Port Gibbon and Point Gibbon. This mapping appears erroneous as aerial and oblique aerial photography and NatureMaps show dense seagrass.

Biota

Remnant vegetation covers an area of 111.72 ha, 26% of the cell. There are two flora survey sites (near Port Gibbon), one opportune flora survey site, 10 herbarium flora records, and 13 opportune fauna survey sites. The Crown land and vegetated blocks near Port Gibbon are recorded as *Eucalyptus oleosa* ssp. mid mallee woodland over *Melaleuca pauperiflora* ssp. *mutica*, +/- *Melaleuca lanceolata*, +/- *Geijera linearifolia* tall shrubs over *Enchylaena tomentosa* var. *tomentosa*, +/- *Atriplex vesicaria* ssp. low shrubs over *Sclerolaena diacantha*. *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa*, *Tetragonia implexicoma*, *Rhagodia candolleana* ssp. *candolleana*, *Pimelea serpyllifolia* ssp. *serpyllifolia* low shrubs, and *Atriplex cinerea*, *Leucophyta brownii*, *Pimelea serpyllifolia* ssp. *serpyllifolia* mid open shrubland on narrow dune areas approaching The Knob.





**Figure 6.65 Port Gibbon: narrow beaches, low Pleistocene clay and sand cliffs. Photo: Coast Protection Board, 2018**

Land Use/Land Ownership

Traditional lands of the Barnjarla people.

There is a narrow coastal reserve of Crown land dedicated to District Council of Franklin Harbor, ranging from 50 to 250 m wide along the entire cell.

The entire nearshore environment of the cell is within the Franklin Harbor Marine Park, which is zoned Habitat Protection Zone 2.

Uses (Field visits and local reports)

Settlement – Port Gibbon settlement.

Conservation – Franklin Harbor Marine Park Habitat Protection Zone offshore.

Agriculture – Cropping, grazing.

Commercial fishing – Marine scale fish, charter fishing.

Recreation & Tourism – Shacks at Port Gibbon, sightseeing, wildlife – sea lions at Port Gibbon, hiking, swimming, surfing, snorkeling, recreational fishing, camping (formal at Pt Gibbon run by DC Franklin Harbor; informal at Gibbon Point along coast to The Knob), horse riding, dog walking, ORV use (four-wheel drive, motorbike), boating, jet skis, kayaking.

Boat launching – Beach (Port Gibbon, Gibbon Point, The Knob).

Values (Field visits and local reports)

Extensive seagrass meadows, low-platform reefs and sandy seafloor.

Conservation – important habitat for threatened shorebirds and fauna (Sooty and Pied Oyster Catcher, Hooded Plover, Australian Sea Lion) and nursery for fish and invertebrates.

Threats (Field visits and local reports)

Agriculture – Grazing.

Pollution – Rubbish dumping, marine debris.

## Cell Description – EP 11 Port Gibbon

Uncontrolled access - ORV use; informal camping; horse riding; firewood collection leading to track creation, destruction of vegetation, dune erosion, disturbance of shorebirds.

Feral animals – Cats, foxes, rabbits.

Weed infestation – African Boxthorn, ornamental succulents.

Future development – Tourism.

### Opportunities (Field visits and local reports)

Council to explore options to formalise camping options and rationalise access along Port Gibbon coast.

Coastal management plans could be prepared and implemented by DEW, EP Landscape Board and private landowners, with particular emphasis on foreshore rehabilitation, revegetation, pest plant and animal control, access control, and stormwater management.

Current shorebird monitoring program at Port Gibbon and The Knob – future actions relating to this program could include: continue Hooded Plover biennial count and territory monitoring during the nesting season; improve management of nesting site(s) at Port Gibbon in conjunction with Port Gibbon community and District Council of Franklin Harbour.

### Conservation Analysis (GIS)

The total of conservation means, 72.83, is low for the region. The cleared and cultivated land making up much of the cell shows low conservation totals; uncleared Crown land in the centre and west of the cell has low to medium totals – this is mainly dune, except for remnant scrub extending across the coastal boundary near Port Gibbon; two small areas of medium totals are found on dunes at the extreme east and western ends of the cell.

The main contributors to the total are average or above scores for vegetation species rarity (averaged moderate over the whole cell), endemic and rare plant associations (averaged high to moderate over the whole cell), endemic floristic vegetation (high in the dunes at the eastern end of the cell), status of threatened fauna species (mostly landward of the dunes), habitat for threatened bird species, habitat for all existing butterflies and habitat for all reptiles is moderate near Port Gibbon and Crown land to the west, habitat for focal species (Beach Slider and East Coast Skink) is located approaching the Knob, viewshed, viewscape, and indigenous heritage. However, this long list of moderate scores in restricted areas does not sum to a large total, largely because of the small area of remnant vegetation.

The 2019 review showed an increase of six additional native flora species recorded since the 2011 data, and eight weed species, bringing the total number of species from 58 records to 69 records by 2019. The table shows only 55 records from 2011 the analysis in the table which can be explained as three records have since been removed in a BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of four additional native fauna species recorded since the 2011 analysis. Two of the fauna records are species with a conservation rating, including the Sooty Oystercatcher *Haematopus fuliginosus* and the Pied Oystercatcher *Haematopus longirostris* both listed as rare under the *National Parks and Wildlife Act 1972* (NPW Act) and the Hooded Plover (Hooded Dotterel) *Thinornis cucullatus*, listed as vulnerable under the NPW Act and *Environment Protection and Biodiversity Conservation Act 1999*. The total number of fauna species remains unchanged by 2019 as four species, part of the 2011 GIS, have since been removed in a BDBSA data update process. If the analysis were repeated for this cell, there has been no significant increase in flora species richness or threatened bird species records that the conservation rating of the cell would remain low.



## Cell Description – EP 11 Port Gibbon

### Threat Analysis (GIS)

The threat total, 52.403, is high for the region. Very high and moderate high totals are widespread across the cell; highest threat values are found near The Knob, Port Gibbon and on the low cliffs approaching Point Gibbon. These are places where the remaining conservation values are found. Off road vehicle activity is widespread throughout Crown land, scrub near Port Gibbon, and around formal camping sites on the Point Gibbon Road; land use and land ownership are high, as is viewshed. Notable threats also include vegetation block degradation (a very high total considering the relative small area of remnant vegetation) and the distribution of dangerous weeds. The concentration of dangerous weeds at The Knob, near to Franklin Harbor CP, is a concern.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, with reports that this activity has resulted in increased vegetation degradation. There are eight additional weed records, one of which is a Declared species, *Gazania*, *Gazania linearis*. The threat rating would remain high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Local beach recession, and dune instability due to foredune damage: this may show local variation in the southern half of the cell due to inshore reefs.	Establish a dune/beach profile to monitor change.	
2070: +c.80cm	Beaches fronting bluffs lost, bluffs and low cliffs show marked recession; Beaches and dunes recede rapidly.	Establish cliff survey markers to monitor erosion of soft rock cliffs.	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes; Tidal flooding of low lying ground.	Continue to monitor shoreline movement; Active management of dunes.	

## Cell Description – EP 11 Port Gibbon

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain and improve connectivity of vegetation.
<b>Drier average conditions:</b> 2030: -2% to 5%  2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage;  Opportunity created for more frequent weed invasion, notably of dune grasses.	Monitor habitat change. Active weed control.	Ensure dune vegetation is within the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Rare flood run-off may deliver sediment, raising saltmarsh land levels.		
<b>Groundwater lowering; saline incursion:</b>	There is potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival.	Adaptive management of plant assets.	
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.61 Recommended Actions and Priority for EP11 Port Gibbon**

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and soft cliffs.	Create a baseline for monitoring shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Sharp erosion likely in response to sea level rise, as sand storage quantities are low and bluffs and cliffs are in soft rock.	Establish a dune/beach profile and cliff erosion survey markers due to proximity to inland development.	Medium (threat)	DEW
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.)	Medium (cons/threat)	EP Landscape Board, Council, community
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, landowners, community groups, Council, EP Landscape Board, DEW, DPC
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons threat)	DEW, EP Landscape Board

## Cell Description – EP 11 Port Gibbon

Component	Issue	Proposed Action	Priority of Action	Key Players
	Management of threatened shorebirds and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season; improve management of nesting site(s) at Port Gibbon and The Knob, access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations.  Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage.	High (cons/ threat)	DEW, EP Landscape Board, Birds Australia DC Franklin Harbour community.
	There are high numbers of dangerous weeds and exotic species in this cell, including garden escapees, notably near the Knob, where vegetation with high % of endemic species also shows high weed numbers (close to Franklin Harbour CP).	Undertake a sequenced plan of weed control to improve the resilience of the conservation assets of this cell.	High (cons/ threat)	EP Landscape Board, landowners
Dunes and clifftops	ORV activity including horse riding and informal camping is applying strong pressure on the coastal reserves.	Rationalise tracks and camping points through consultation and local access control. Coastal management plans prepared and implemented with particular emphasis on foreshore rehabilitation, revegetation, pest plant and animal control, access control, and stormwater management.	High (Cons/ threat)	DEW, EP Landscape Board, community DC Franklin Harbor Tourism SA

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	111.72 ha (26.02 % of the cell)
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## Cell Description – EP 11 Port Gibbon

<b># flora surveys / records</b>	2 (3*) surveys, 1 (0*) opportune sites, 10 (3*) Herbarium records
<b># flora in cell</b>	69 (58*)
<b># conservation rated flora in cell</b>	1 (1*)
<b># non-indigenous flora in cell</b>	17 (9*)
<b>Significant CDCS floristic community</b>	<i>Atriplex vesicaria</i> ssp. Shrubland – 71% of SA records in EP
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Agave americana</i>	Century Plant		-
<i>Aloe brevifolia</i>			-
<i>Aloe maculata</i>	Broad-leaf Aloe		-
<i>Avellinia michelii</i>	Avellinia		0
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Cotyledon orbiculata</i> var. <i>orbiculata</i>	Pig's Ear		1
<i>Crassula tetragona</i> ssp. <i>robusta</i>	Crassula		-
<i>Echium plantagineum</i>	Salvation Jane	D	2
<i>Euphorbia clandestina</i>			-
<i>Gazania linearis</i>	Gazania	D	-
<i>Limonium companyonis</i>	Sea-lavender		7
<i>Limonium sinuatum</i>	Notch-leaf Sea-lavender		3
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Mesembryanthemum crystallinum</i>	Common Iceplant		4
<i>Mesembryanthemum nodiflorum</i>	Slender Iceplant		2
<i>Schismus barbatus</i>	Arabian Grass		0

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia oswaldii</i>	Umbrella Wattle		
<i>Acacia sclerophylla</i> var. <i>sclerophylla</i>	Hard-leaf Wattle		
<i>Amyema melaleucae</i>	Tea-tree Mistletoe		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Austrostipa acrocliliata</i>	Graceful Spear-grass		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Austrostipa exilis</i>	Heath Spear-grass		

Cell Description – EP 11 Port Gibbon

Species	Common Name	Aus status	SA status
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Cassytha melantha</i>	Coarse Dodder-laurel		
<i>Chenopodium curvispicatum</i>	Cottony Goosefoot		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Cratystylis conocephala</i>	Bluebush Daisy		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eremophila scoparia</i>	Broom Emubush		
<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush		
<i>Eucalyptus dumosa</i> complex	White Mallee		
<i>Eucalyptus gracilis</i>	Yorrell		
<i>Eucalyptus oleosa</i> (NC)	Red Mallee		
<i>Eucalyptus oleosa</i> ssp. <i>oleosa</i>	Red Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Hemichroa diandra</i>	Mallee Hemichroa		
<i>Homoranthus willhelmii</i>	Wilhelm's Homoranthus		
<i>Lawrencia squamata</i>	Thorny Lawrencia		
<i>Lichen</i> sp.			
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree		
<i>Melaleuca pauperiflora</i> ssp. <i>mutica</i>	Boree		
<i>Microlepidium pilosulum</i>	Hairy Shepherd's-purse		R
<i>Moss</i> sp.			
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia muelleri</i>	Mueller's Daisy-bush		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podolepis tepperi</i>	Delicate Copper-wire Daisy		
<i>Ptilotus obovatus</i>	Silver Mulla Mulla		
<i>Ptilotus seminudus</i>	Rabbit-tails		
<i>Rhagodia crassifolia</i>	Fleshy Saltbush		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Scaevola spinescens</i>	Spiny Fanflower		
<i>Sclerolaena diacantha</i>	Grey Bindyi		
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
<i>Senecio glossanthus</i> (NC)	Annual Groundsel		
<i>Sporobolus virginicus</i>	Salt Couch		
<i>Suaeda australis</i>	Austral Seablite		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Wilsonia rotundifolia</i>	Round-leaf Wilsonia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

## Cell Description – EP 11 Port Gibbon

### Fauna

# of fauna in cell	20 (20*) recorded – 19 (19*) birds, 1 (1*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 16* reptiles and 25* butterflies identified by experts as possibly occurring)
# of fauna surveys / records	0 (0*) survey sites, 13 (5*) opportune sites
# of threatened fauna in cell	4 (3*)
# of non-indigenous fauna	1 (1*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weed, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White		p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Corvus coronoides</i>	Australian Raven		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Gavialis vireescens</i>	Singing Honeyeater		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Larus pacificus</i>	Pacific Gull		
<i>Morus serrator</i>	Australasian Gannet		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

No butterflies listed in 2019 data.



## Cell Description – EP 11 Port Gibbon

Species	Common Name	Status*	Record
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Candalides heatbi heatbi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamennus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammals listed in 2019 data or 2011 data.

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Hemiergis peronii</i>	Four-toed Earless Skink			x
<i>Acanthopbis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lialis burtonis</i>	Burton's Legless Lizard			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c

## Cell Description – EP 11 Port Gibbon

Species	Common Name	Aus status	SA status	Record
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibians listed in 2019 data or 2011 data.

### Cell EP 12 Mills Beach

Cell area 675.62 ha. Shoreline length 7.7 km.



#### Landforms

The curve of Mills Beach rotates from south-east facing to south-facing near Gibbon Point. The entire shore is medium to low energy coarse, sandy beach, backed by dunes which steadily widen from west to east, until Gibbon Point where dunes occupy the entire width of the cell. A remarkable feature of this cell is the extent of de-vegetated dune: in the eastern half, the dune is almost entirely de-vegetated and unstable. At Gibbon Point, unstable dunes overlie an extensive basement rock platform. The western end of the cell is protected by nearshore reef, the shore is low energy and only small quantities of sand are found in the beach/dune system. From Mills Beach to the east, the unstable dune barrier blocks a large low-lying intermittently flooded area fed by a number of creeks; this lowland is comprised of saltflats, samphire and acacia shrubland. In places, the unstable

dunes have extended as blowout sand ridges, funnelled through breakouts across the acacia shrubland bordering the dunes, to extend across the samphire lowland.

#### Benthic Habitat

National benthic mapping reports bare sand offshore, except for a narrow inshore reef in the western-most third of the cell. Oblique aerial photography and NatureMaps show patchy seagrass throughout.

#### Biota

Remnant vegetation covers an area of 469.6 ha. 69% of the cell. There are two flora survey sites (both on the *Acacia cupularis* shrubland) and one opportune fauna site were located. One third of the cell is in sand dune, nearly half of this is de-vegetated. Inland from the de-vegetated dunes are low-lying *Acacia cupularis* shrubland then *Tecticornia* sp. low sparse shrublands; these samphire shrublands are on intermittently flooded saline flats, (though not recorded on the coastal samphire survey, they appear to be a stranded supra-tidal flat). The narrow dunes west of Mills Beach show *Eucalyptus incrassata* mid mallee woodland over *Melaleuca uncinata*, *Leptospermum*

## Cell descriptions – EP 12 Mills Beach

*coriaceum* mid shrubs over *Calytrix involucreta* low shrubs over +/- *Schoenus racemosus*, +/- *Triodia lanata*. Inland from these dunes is cleared land, then *Eucalyptus dumosa* mallee woodland.

### Land Use/ Land Ownership

Traditional lands of the Barngarla people.

There is a coastal reserve of Crown land along the length of the cell, which is narrow towards the western end of the cell and gets wider towards the eastern end. The western section of the cell is unalienated Crown land that is leased under a full annual licence, the mid-section is unalienated Crown land, and the eastern section is Crown land dedicated to District Council of Franklin Harbor. 25% of the cell is unalienated Crown land in a coastal reserve, including all the dune land.

The nearshore environment of the eastern end of the cell falls within the Franklin Harbor Marine Park, which is zoned Habitat Protection Zone 2.



**Figure 6.66 Gibbon Point, looking west towards Mills Beach in the background. Photo: Coast Protection Board, 2018**

### Uses (Field visits and local reports)

Conservation – Franklin Harbor Marine Park Habitat Protection Zone offshore.

Agriculture – Cropping, Grazing.

Commercial fishing – Marine scale fish, Charter fishing.

Recreation & Tourism – Sightseeing, sea lions at Port Gibbon, hiking, swimming, surfing, snorkelling, recreational fishing, camping (informal – Horseshoe, Mills Beach), horse riding, dog walking, unofficial swimming/snorkelling with sea lions, ORV use (four-wheel drive, motorbike), boating, jet skis, kayaking.

Boat launching – Mills Beach.

## Cell descriptions – EP 12 Mills Beach

### Values (Field visits and local reports)

Extensive patchy seagrass meadows, low-platform reefs and sandy seafloor.  
Conservation – Franklin Harbor Marine Park Habitat Protection Zone offshore. Important habitat for threatened shorebirds and fauna (Sooty and Pied Oyster Catcher, Hooded Plover, Australian Sea Lion) and nursery for fish and invertebrates.

### Threats (Field visits and local reports)

Agriculture – Grazing.  
Proximity to aquaculture – Marine debris from Arno Bay and Franklin Harbor.  
Pollution – Rubbish dumping (informal campsites), marine debris (as above).  
Uncontrolled access – ORV use, informal camping, firewood collection leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.  
Feral animals – Rabbits, foxes.  
Weed infestation.

### Opportunities (Field visits and local reports)

Extend Shorebird/Hooded Plover monitoring program to Mills Beach.  
Opportunity to collaborate with DC Franklin Harbour to increase Hooded Plover monitoring during their nesting season, to determine importance of this site for nesting pairs.  
EP NRM Saltmarsh Threat Abatement and Recovery Project, National Landcare Program 2 (Australian Government).  
Implement pest plant and animal control program in Hooded Plover nesting territories, EP NRM, DC Franklin Harbour.  
Formalisation of Campgrounds at Gibbon Point and track rationalization as part of collaborative project between EP Landscape Board, EP LGA, Regional Development Australia Whyalla Eyre Peninsula, DC Franklin Harbour.

### Conservation Analysis (GIS)

Although remnant vegetation covers over two thirds of the cell, the sum of conservation means, 91.63, is low for the region. Totals are low to medium-low on the de-vegetated sections of dunes and the post barrier wetlands; the vegetated dunes and *Acacia* shrublands show medium totals. The principal factors contributing to the total are viewscape and viewshed, vegetation metrics, indigenous heritage, habitat for threatened birds and numbers of threatened fauna species. Beach habitat for focal species Pied Oystercatcher, dune habitat for focal species Bight Coast Skink and Beach Slider add some values. The reefs and platforms of basement rocks Point Gibbon are a haul out site for Australian Sea Lions.

The 2019 review showed two additional native flora species recorded since the 2011 data, and no additional weed species, with a total number of 32 species records by 2019. This is unchanged from 2011 the analysis in the table which can be explained as one record has since been removed in a BDBSA data update process (e.g. it may have been considered unreliable). The 2019 review showed an increase of 13 additional native fauna species recorded since the 2011 analysis, as well as one additional non-indigenous species, bringing the total number of fauna species records to 14, compared with two in 2011. One of the fauna records is a species with a conservation rating, the Hooded Plover, *Thinornis cucullatus*, listed as vulnerable under the *National Parks and Wildlife Act 1972* (NPW Act) and the *Environment Protection and Biodiversity Conservation Act 1999*. If the analysis were repeated for this cell, the increase in fauna species richness and threatened bird species records may be enough to raise the conservation rating of the cell to medium.

## Cell descriptions – EP 12 Mills Beach

### Threat Analysis (GIS)

60.308, the threat total, is high for the region. High totals are found across all parts of the cell; only near Point Gibbon and Mills Beach do total threats fall to medium. Examination of individual threat layers shows some striking results: vegetation block degradation and distribution of dangerous weeds are amongst the highest in the region; ORV activity and dune instability are high; scores for land ownership and land use, viewscape and viewshed also contribute.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, with reports that this activity is having ongoing disturbance, inhibiting native vegetation recovery. The threat rating would remain high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Local beach recession and dune instability due to foredune damage.	Establish a dune/ beach profile to monitor change; Strategically manage dunes to slow recession.	
2070: +c.80cm	Beaches and dunes recede rapidly; Low sand storage and poorly vegetated dunes make this cell prone erosion from sea level rise and storms.	Allow for buffer to accommodate transgressive movement of dunes due to sea level rise.	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes; Tidal flooding of low-lying ground.	Continue to monitor shoreline movement Active management of dunes.	
<b>Warmer average conditions:</b> 2030:+0.3 to.6°C 2070:+1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain and improve connectivity of vegetation.

Cell descriptions – EP 12 Mills Beach

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Monitor habitat change; Dune management to reduce transgression.	
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	From Mills Beach to the east. Rare flood run-off may deliver sediment, raising saltmarsh land levels.		
<b>Groundwater lowering; saline incursion:</b>	Saline groundwater incursion into nearshore lowlands	Monitor groundwater in order to manage soil and plant assets	
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement		

**TABLE 6.62 Recommended Actions and Priority for EP12 Mills Beach**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	African boxthorn is mapped through all vegetated habitats of this cell; notably in or adjacent to the unalienated Crown land.	Undertake a sequenced plan of weed control to improve the resilience of the conservation assets of this cell.	High (cons/threat)	EP Landscape Board, landowners
	Ongoing and accelerating sea level beginning to cause change in dunes.	Create a baseline for monitoring shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board



## Cell descriptions – EP 12 Mills Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
	ORV activity is widespread with increasing pressure from formal and informal camping - Vegetated dunes SW of Mills Beach and Acacia shrubland fringing dune barrier in the NE are valuable habitats threatened by this activity.	Access control to protect the remnant values of this cell; co-ordinated with weed control in these areas.	High (cons/threat)	EP Landscape Board, DEW, Tourism SA
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.)	Medium (cons/threat)	EP Landscape Board, DC Franklin Harbour, community
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, landowners, community groups, DC Franklin Harbour, EP Landscape Board, DEW, DPC Aboriginal Heritage

## Cell descriptions – EP 12 Mills Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important habitat for threatened shorebirds, Australian Sea Lion, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to sensitive areas eg. Manage human interactions with Australian Sea Lion population at Gibbon Point, and activities that impact on shorebirds; continue to implement current shorebird/Hooded Plover monitoring program at Gibbon Point; Extend monitoring program to Mills Beach; Access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection.	High (cons/ threat)	DEW, EP Landscape Board, Birdlife Australia DC Franklin Harbour, community
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board

## Cell descriptions – EP 12 Mills Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
Post barrier wetlands	Marine saline groundwater pressure increases due to sea level rise; Storm dune overtopping increasingly possible.	Monitor groundwater in order to manage soil and water assets.	Medium (cons/threat)	DEW

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	469.57 ha (69.48 % of the cell)
<b># flora surveys / records</b>	2 (2*) surveys, 0 (0*) opportune sites, 0 (0*) Herbarium records
<b># flora in cell</b>	30 (30*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	6 (6*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	None of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Cakile maritima ssp. maritima</i>	Two-horned Sea Rocket		1
<i>Hypochaeris sp.</i>	Cat's Ear		1
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		2
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

#### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia ligulata</i>	Umbrella Bush		
<i>Acrotriche patula</i>	Prickly Ground-berry		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		

## Cell descriptions – EP 12 Mills Beach

Species	Common Name	Aus status	SA status
<i>Carpobrotus sp.</i>	Pigface		
<i>Clematis microphylla var. microphylla (NC)</i>	Old Man's Beard		
<i>Comesperma volubile</i>	Love Creeper		
<i>Crassula sieberiana ssp. tetramera (NC)</i>	Australian Stonecrop		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Gramineae sp.</i>	Grass Family		
<i>Hakea cycloptera</i>	Elm-seed Hakea		
<i>Leucophyta brownii</i>	Coast Cushion Bush		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Maireana oppositifolia</i>	Salt Bluebush		
<i>Melaleuca balmaturorum</i>	Swamp Paper-bark		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Oxalis peremans (NC)</i>	Native Sorrel		
<i>Pelargonium littorale</i>	Native Pelargonium		
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush		
<i>Spinifex hirsutus (NC)</i>	Rolling Spinifex		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	14 (2*) recorded – 14 (2*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 17* reptiles and 26* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 1 (0*) opportune sites
<b># of threatened fauna in cell</b>	1 (0*)
<b># of non-indigenous fauna</b>	1 (0*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

## Cell descriptions – EP 12 Mills Beach

### Birds

Species	Common Name	Aus status	SA status
<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Falco berigora</i>	Brown Falcon		
<i>Gavicalis vireescens</i>	Singing Honeyeater		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Malurus leucopterus</i>	White-winged Fairywren		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Psephotellus varius</i>	Mulga Parrot		
<i>Purnella albifrons</i>	White-fronted Honeyeater		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Belenois java teutonia</i>	Caper White	migrant	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R and vagrant	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplexa</i>	Western Dusky-blue		p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	migrant	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC and migrant	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	Locally uncommon	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	Locally uncomon	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	Locally uncommon	p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	vagrant	p
<i>Theclinessthes albocincta</i>	Bitter-bush Blue		p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	Locally uncommon	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Vanessa itea</i>	Australian Admiral	Locally uncommon, migrant	p
<i>Vanessa kersbavi</i>	Australian Painted Lady	LC and migrant	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

## Cell descriptions – EP 12 Mills Beach

### Mammals

No terrestrial mammals listed in 2019 data or 2011 data.

### Reptiles

No reptile species recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Hemierygis peronii</i>	Four-toed Earless Skink			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lialis burtonis</i>	Burton's Legless Lizard			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2019 data or 2011 data.

## Cell EP 13 Red Banks

Cell area 543.62 ha. Shoreline length 11.0 km.



### Landforms

This cell is a low-lying coastal plain, composed of Pleistocene sediments over basement rocks; the coastal boundary is almost entirely at the default 500 m line; one small area of coastal habitat (samphire) transgresses this line. The character of the coastal plain is clearly shown east of Poverty Bay, with a near flat red sand Pleistocene plain and a low (<5 m) bluff backing short white-sand ramps, forming a narrow, fine sand, high tide beach, and a wide shore platform and sub-tidal reef. At the western end of the cell, beaches are narrow at high tide, with low tide to sub-tidal platforms in basement rocks, backed by low bluffs in Pleistocene sediments with low discontinuous 'bluff top' dunes. At Poverty Bay there is a small accumulation of white Holocene sand, c. 200 m wide, which forms a barrier to Windittie Creek, an occasional creek that terminates in a small sub-coastal swampland. The dunes at Poverty Bay

show contrast between the eastern half, which is well-protected by reefs and has retained some shrubland, and the less protected western half that retains very little vegetation. Southwest of Poverty Beach, red Pleistocene sand parallel arid dune ridges are seen striating the plain within the coastal boundary. Sprigg (1979) noted that these parallel WNW–ESE trending dunes formerly extended across the floor of the Gulf, and that the red sands were mixed with more recent white sands during the Holocene transgression: the modern mixed red and white sand dunes can be seen within this cell.

### Benthic Habitat

National benthic mapping reports a narrow inshore reef along the majority of the cell, with bare sand, while aerial photography depicts medium density seagrass offshore.

### Biota

Remnant vegetation covers an area of 291 ha, 54% of the cell. There are two herbarium flora record sites, one opportune flora survey site and 13 opportune fauna survey sites within the cell. Partly de-stabilised low cliff top dunes at Red Banks show remnant patches of *Eucalyptus incrassata*, *Eucalyptus socialis* ssp. mid mallee woodland, also *Nitraria billardiarei*, +/- *Olearia axillaris*



## Cell Descriptions – EP 13 Red Banks

mid open shrubland. Other dunes, including the eastern half of Poverty are recorded as *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland. Swampland trapped by the Poverty Bay dune barrier is *Tecticornia* sp. low sparse shrubland over *Disphyma crassifolium* ssp. *Clavellatum*. The low headland at the W end of Poverty Bay records a *Acacia cupularis*, +/- *Dodonaea viscosa* ssp. *Spatulata*, *Beyeria lechenaultii*, *Olearia axillaris* tall sparse shrubland.



**Figure 6.67 Western end of Poverty Bay. Photo: Coast Protection Board, 2018**

### Land Use/ Land Ownership

Traditional lands of the Barngarla people.

A narrow reserve of unalienated Crown land extends along the length of the cell from Poverty Bay to the northeast, includes shoreline and bluff, and is subject to a number of full annual licenses. A Heritage Agreement (1026) includes part of the western end of the cell.

### Uses (Field visits and local reports)

Conservation - Vegetation Heritage Agreement 1026.

Agriculture – Cropping, grazing.

Commercial fishing – Marine scale fish, charter fishing.

Recreation & Tourism – Sightseeing, nature, hiking, swimming, surfing, snorkelling, recreational fishing, camping (informal at Red Banks, Poverty Bay), horse riding, dog walking, ORV use (four-wheel drive, motorbike), boating, jet skis, kayaking.

Boat launching – Beach at Poverty Bay.

### Values (Field visits and local reports)

Conservation – important habitat for threatened flora (*Acacia rheticarpa* – Resin Wattle) and threatened fauna (Hooded Plovers).

## Cell Descriptions – EP 13 Red Banks

### Threats (Field visits and local reports)

Agriculture – grazing.

Proximity to aquaculture – Marine debris.

Pollution – Rubbish dumping (informal campsites), marine debris (as above).

Uncontrolled access – ORV use, informal camping, firewood collection leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Feral animals – Rabbits, foxes.

Weed infestation.

Climate change – Increased dune erosion due to creek flooding.

### Opportunities (Field visits and local reports)

The Vegetation Heritage Agreement 1026 presents the opportunity for DEW to work with the landholder to protect mid-mallee woodland on dunes, including threatened species and butterfly habitat.

Collaboration between EP Landscape Board, EP LGA, Regional Development Australia Whyalla Eyre Peninsula (RDAWEP), DC Franklin Harbour and DC Cleve to formalise camping options and rationalise access along coast.

Coastal management plans could be developed and implemented through collaboration with DEW, EP Landscape Board, local landowners and local government (DC Franklin Harbour/DC Cleve), with particular emphasis on revegetation, pest plant and animal control and access control.

Continue shorebird monitoring program through biennial count monitoring. Opportunity to increase Hooded Plover territory monitoring during the nesting season to determine the value of this area for nesting pairs.

### Conservation Analysis (GIS)

The total of conservation means, 61.75, is one of the lowest for the region. Approximately half the cell records very low totals, the rest low to medium; medium totals are in small cliff top dune areas near Red Banks (heritage agreement) and vegetated dunes at Poverty Bay (east). Of the individual layers, only threatened flora species, viewshed and viewscape show above average values. The highest priority for endemic floristic vegetation is recorded for almost all vegetated dune areas; Moderate values for all existing reptiles is widely recorded north-east of Poverty Bay. Habitat for focal species Pied Oystercatcher, Beach Slider and Bight Coast Skink is found on beaches and dunes throughout the cell. The heritage area near Red Banks shows moderate totals for fauna species, number of threatened species; it records the highest priority for butterfly habitat (and good values for this are found in all vegetated areas within the cell); The Geological Monument 'E24 Arno Bay' is the outcrop of the Pooraka Formation found in the foreshore and cliffs at Red Banks.

The 2019 review showed a significant increase in the number of additional native flora species recorded, an increase of 55 records, since the 2011 data, and one additional weed species record, with a total number of 66 flora species records by 2019 compared with 14 in 2011. Six flora records have since been removed in a BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of three additional native fauna species recorded since the 2011 analysis, bringing the total number of species to 13 – unchanged from 2011, due to three records being removed in a BDBSA data update process. One of the fauna records is a species with a conservation rating, the Hooded Plover (Hooded Dotterel) *Thinornis cucullatus*, listed as vulnerable under the *National Parks and Wildlife Act 1972* (NPW Act) and the *Environment Protection and Biodiversity Conservation Act 1999*. If the analysis were repeated

## Cell Descriptions – EP 13 Red Banks

for this cell, even though flora species richness has increased, along with the presence of a threatened bird species, it is unlikely that this would be enough to raise the conservation rating of the cell to medium.

### Threat Analysis (GIS)

The threat total is high for the region, 53.919. Combined detailed totals are very high to high across all parts of the cell, with the exception of a heritage agreement area immediately NE of Red Banks; the largest areas of very high threat totals are in the NE of the cell. Although approximately half this cell is in remnant vegetation, it appears to be badly degraded: high total scores are found for off road vehicle activity, vegetation degradation, distribution of dangerous weeds (high threat totals are found throughout the cell, with the exception of the heritage area, although here there is an area of dangerous weed incursion in valuable dune scrub), viewshed and viewscape, land ownership and land use zoning. SW of Poverty Bay there are informal camp and parking sites in the dunes; ORV activity is found along the low cliffs and dunes throughout the cell.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, with reports that this activity has resulted in increased vegetation degradation. There is also one additional weed record. The threat rating would remain high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Soft Pleistocene and Holocene sediments (over basement rocks and nearshore reefs) will be prone to accelerated erosion.	Establish a cliff recession survey marker system, to monitor this change.	
2070: +c.80cm.	Narrow high tide beaches fronting bluffs lost; bluffs and cliffs recede rapidly; Low sand storage render this cell prone to erosion from sea level rise and storms.		

## Cell Descriptions – EP 13 Red Banks

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<p><b>Storms:</b>  <i>Frequency</i> continues to show great variation on a decadal scale  <i>Intensity</i> of large storms increases</p>	<p>2030: Occasional storm tide flooding above highest known tides; damage to foredunes.</p>	<p>Continue to monitor shoreline processes.</p>	
<p><b>Warmer average conditions:</b>            2030: +0.3 to 0.6°C            2070: +1.5 to 2°C</p>	<p>Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.</p>		<p>Maintain and improve connectivity of vegetation.</p>
<p><b>Drier average conditions:</b>            2030: -2% to 5%            2070: -10% to 20%</p>	<p>Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.</p>	<p>Monitor habitat change, notably valuable dune sites with existing weed incursion.</p>	
<p><b>'Flashy' run off:</b>            Drier creeks, but larger rare floods</p>	<p>Rare flood run-off may deliver sediment down Windittie Creek, (an occasional creek) raising coastal swamp land levels as well as increased dune erosion due to creek flooding.</p>		
<p><b>Groundwater lowering; saline incursion:</b></p>	<p>Saline groundwater incursion into nearshore lowlands.</p>	<p>Monitor groundwater in order to manage soil and plant assets.</p>	
<p><b>Nearshore sea changes - temperature; acidity; wave climate:</b>            2030: +0.3°C to +0.6°C            2070: +1.0°C to +1.5°C</p>	<p>Persistent swell wave climate maintains sediment movement.</p>		

Cell Descriptions – EP 13 Red Banks

**TABLE 6.63 Recommended Actions and Priority for EP13 Red Banks**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes.	Create a baseline for monitoring shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (threat)	DEW, EP Landscape Board
	Sharp erosion likely in response to sea level rise, as sand storage quantities are low and cliffs and bluffs are in soft rock; Former shelter afforded by reefs reduced by sea level rise.	Establish a dune/ beach profile and cliff erosion survey markers; Strategic management of dunes to slow retreat.	High (threat)	DEW, EP Landscape Board
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/ threat)	EP Landscape Board, DC Franklin Harbour/ DC Cleve, community
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board
	Weed species identified through all vegetated habitats of this cell; notably in or adjacent to the unalienated Crown land.	Undertake a sequenced plan of weed control to improve the resilience of the conservation assets of this cell.	High (cons/ threat)	DEW, EP Landscape Board, landowners

## Cell Descriptions – EP 13 Red Banks

Component	Issue	Proposed Action	Priority of Action	Key Players
	ORV activity is widespread with increasing pressure from formal and informal camping at Red Banks and Poverty Bay which contain valuable habitats threatened by this activity.	Access control to protect the remnant values of this cell; co-ordinated with weed control in these areas.	High (cons/threat)	DEW, EP Landscape Board, community DC Franklin Harbour/ DC Cleve Tourism SA
	Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia DC Franklin Harbour/DC Cleve community
Coastal swamplands near Poverty Bay	Marine saline groundwater pressure increases due to sea level rise.	Monitor groundwater in order to manage soil and water assets.	Medium (threat)	DEW
Geological monument at Redbanks cliffs	Significant geological features present – GSA reference (E24 pt 3).	Interpretive signage.	Low (threat)	GSA (SA Branch), DEW EP Landscape Board DC Cleve

## Cell Descriptions – EP 13 Red Banks

Component	Issue	Proposed Action	Priority of Action	Key Players
Heritage Agreement	The Vegetation Heritage Agreement 1026	Opportunity for EP NRM to work with the landholder to protect mid-mallee woodland on dunes, including threatened species and butterfly habitat.	Medium (cons)	DEW, EP Landscape Board, landowner

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	291.4 (53.60 % of the cell)
<b># flora surveys / records</b>	0 (0*) surveys, 1 (0*) opportune sites, 2 (3*) Herbarium records
<b># flora in cell</b>	66 (14*)
<b># conservation rated flora in cell</b>	2 (2*)
<b># non-indigenous flora in cell</b>	1 (4*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	11.64% of vegetation in the cell is protected, 6% of vegetation protected within Heritage Agreement.

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Reichardia tingitana</i>	False Sowthistle		3

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia ancistrophylla</i> var. <i>lissophylla</i>	Hook-leaf Wattle		
<i>Acacia farinosa</i>	Mealy Wattle		
<i>Acacia microcarpa</i>	Manna Wattle		
<i>Acacia rhotinocarpa</i>	Resin Wattle	VU	V
<i>Acacia rigens</i>	Nealie		
<i>Acacia spinescens</i>	Spiny Wattle		
<i>Atriplex acutibractea</i> ssp. <i>karoniensis</i>	Pointed Saltbush		
<i>Boronia inornata</i> ssp. <i>leptophylla</i>	Dryland Boronia		
<i>Carpobrotus modestus</i> / <i>rossii</i>	Native Pigface		



Cell Descriptions – EP 13 Red Banks

Species	Common Name	Aus status	SA status
<i>Caszytha</i> sp.	Dodder-laurel		
<i>Chenopodium desertorum</i> ssp.	Desert Goosefoot		
<i>Correa backhouseana</i> var. <i>coriacea</i>	Thick-leaf Correa		
<i>Dianella brevicaulis/ revoluta</i> var.	Black-anther Flax-lily		
<i>Dodonaea bursariifolia</i>	Small Hop-bush		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eremophila crassifolia</i>	Thick-leaf Emubush		
<i>Eremophila glabra</i> ssp. <i>glabra</i>	Tar Bush		
<i>Eremophila subfloccosa</i> ssp. <i>lanata</i>	Woolly Emubush		
<i>Eucalyptus dumosa</i>	White Mallee		
<i>Eucalyptus gracilis</i>	Yorrell		
<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee		
<i>Eucalyptus leptophylla</i> (NC)	Narrow-leaf Red Mallee		
<i>Eucalyptus socialis</i> (NC)	Beaked Red Mallee		
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Gahnia densta</i>	Limestone Saw-sedge		
<i>Gahnia lanigera</i>	Black Grass Saw-sedge		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Goodenia varia</i>	Sticky Goodenia		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Gyrostemon australasicus</i>	Buckbush Wheel-fruit		
<i>Haeckeria cassiniiformis</i>	Dogwood Haeckeria		R
<i>Halgania andromedifolia</i>	Scented Blue-flower		
<i>Hibbertia riparia</i> (NC)	Guinea-flower		
<i>Hybanthus floribundus</i> ssp. <i>floribundus</i>	Shrub Violet		
<i>Lasiopetalum behrii</i>	Pink Velvet-bush		
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge		
<i>Lomandra collina</i>	Sand Mat-rush		
<i>Maireana brevifolia</i>	Short-leaf Bluebush		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	Mallee Honey-myrtle		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca uncinata</i>	Broombush		
<i>Microcybe multijflora</i> ssp.	Small-leaf Microcybe		
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia</i> sp.	Daisy-bush		
<i>Ozothamnus decurrens</i>	Ridged Bush-everlasting		
<i>Phebalium bullatum</i>	Silvery Phebalium		
<i>Pimelea micrantha</i>	Silky Riceflower		
<i>Podolepis rugata</i> ssp. <i>littoralis</i>			
<i>Prostanthera aspalathoides</i>	Scarlet Mintbush		
<i>Prostanthera serpyllifolia</i> ssp. <i>microphylla</i>	Small-leaf Mintbush		
<i>Ptilotus seminudus</i>	Rabbit-tails		
<i>Rhagodia crassifolia</i>	Fleshy Saltbush		
<i>Rhagodia preissii</i> ssp. <i>preissii</i>	Mallee Saltbush		
<i>Santalum acuminatum</i>	Quandong		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Thryptomene micrantha</i>	Ribbed Thryptomene		
<i>Triodia irritans</i>	Spinifex		

## Cell Descriptions – EP 13 Red Banks

Species	Common Name	Aus status	SA status
<i>Vittadinia dissecta</i> var. <i>hirta</i>	Dissected New Holland Daisy		
<i>Westringia eremicola</i>	Slender Westringia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	13 (13*) recorded – 13 (13*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 17* reptiles and 26* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 13 (2*) opportune sites
<b># of threatened fauna in cell</b>	1 (0*)
<b># of non-indigenous fauna</b>	0 (0*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

No non-indigenous fauna recorded in 2019.

Species	Common Name	Class	Record
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

## Cell Descriptions – EP 13 Red Banks

### Butterflies

Species	Common Name	Status*	Record
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Belenois java teutonia</i>	Caper White	migrant	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R and vagrant	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	migrant	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC and migrant	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	Locally uncommon	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	Locally uncommon	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	Locally uncommon	p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	vagrant	p
<i>Theclinessthes albocincta</i>	Bitter-bush Blue		p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	Locally uncommon	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Vanessa itea</i>	Australian Admiral	Locally uncommon, migrant	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC and migrant	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammals recorded in 2019 data or in 2011 data.

### Reptiles

No reptiles recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e

## Cell Descriptions – EP 13 Red Banks

Species	Common Name	Aus status	SA status	Record
<i>Hemiergis peronii</i>	Four-toed Earless Skink			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lialis burtonis</i>	Burton's Legless Lizard			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

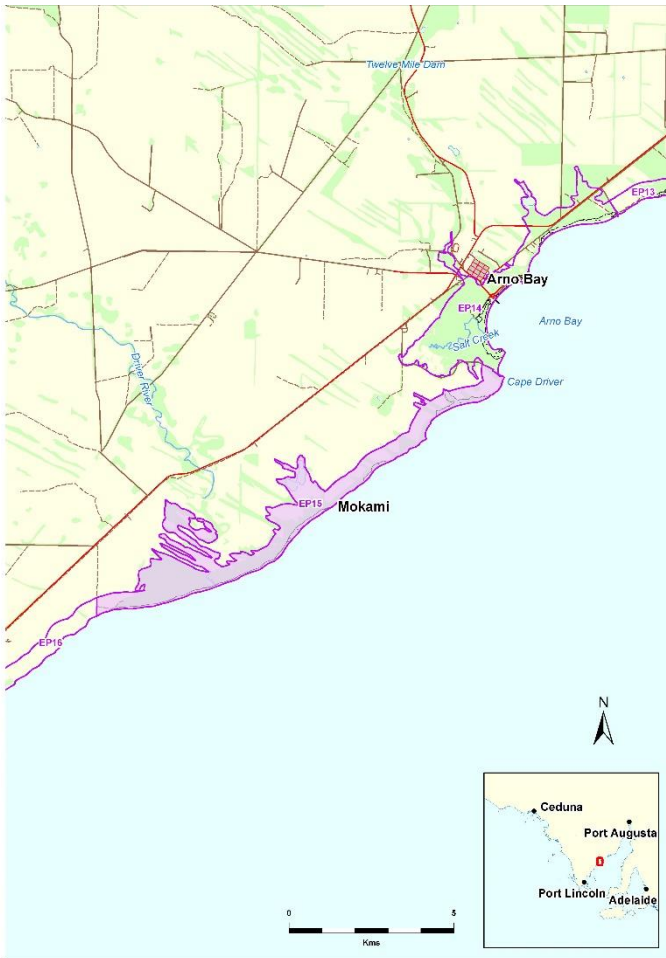
R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibians recorded in 2019 data or 2011 data.

**Cell EP 15 Werrina**

Cell area 1208 ha. Shoreline length 12.08 km.



Landforms

This low coastal plain is primarily of Pleistocene fluvial and aeolian material: Pleistocene arid land linear dunes running approximately ENE-WSW indent the landward coastal boundary, extending into the cell in the north. Holocene coastal dune barriers block drainage from near coast seasonal wetlands, except at the mouth of the Driver River, which allows high tide incursion to a large coastal lowland in the south of the cell. Beaches are low energy and of coarse sand, with the exception of a fine-medium sand small embayment immediately south of Point Driver. Pleistocene sediments form low bluffs over basement rocks at most headlands; white Holocene sands form high tide beaches above low tide basement reefs at the many small embayments.

Benthic Habitat

Patchy inshore sand and basement reefs, then dense seagrass offshore.

Biota

Remnant vegetation covers an area of 688 ha, 56.95 % of the cell (none protected). There are two herbarium flora record sites, two flora survey sites and one opportune fauna survey site within the cell. Extensive areas of low ground mapped as *Tecticornia* low shrubland<sup>1</sup>. Coastal and some Pleistocene dunes include *Olearia axillaris* mixed shrubland and *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland. Most Pleistocene ridges are in mallee woodland: *Eucalyptus incrassate*, *Eucalyptus socialis ssp.* mid mallee woodland; other ridges are *Eucalyptus incrassata*+/- *Eucalyptus dumosa*+/-*Eucalyptus gracilis* mid mallee woodland.

Land Use/Land Ownership

Traditional lands of the Barngarla people.

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<sup>1</sup> State coastal saltmarsh mapping was not carried out for all these areas (although they are recorded on Commonwealth remote sensing floristic maps). Hence, they do not appear on the digital interactive map, and they may not have been given appropriate values in the conservation assessment. It is possible that this cell is undervalued as a result of this.

## Cell Descriptions – EP 15 Werrina

11% of the cell is unalienated Crown land, which forms a narrow coastal reserve along the entire cell. There is also a small area of perpetual lease directly abutting the coastal cell at the boundary of DC Cleve and DC Tumby.

### Uses (Field Visits and Local Reports)

Conservation – Local council coastal reserves, Crown reserves.

Agriculture – Cropping, grazing.

Commercial fishing – Marine scale fish, charter fishing.

Recreation & Tourism – Sightseeing, nature, hiking, swimming, surfing, snorkelling, recreational fishing, camping (informal at Cox's Beach, Noble's Beach), dog walking, ORV use (four-wheel drive, motorbike), boating, jet skis, kayaking.

Boat launching – Beach.



**Figure 6.68 Mokami. Photo: Coast Protection Board, 2018**

### Values (Field visits and local reports)

Conservation – Important habitat for threatened fauna (Hooded Plovers).

Tidal flood plains and samphire habitat.

### Threats (Field visits and local reports)

Agriculture – Grazing.

Proximity to aquaculture – Marine debris.

Over fishing – Recreational.

Pollution – Rubbish dumping, garden waste dumping, marine debris.

Uncontrolled access – ORV use, informal camping (Nobles Beach), firewood collection leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Feral animals – Rabbits, foxes.

## Cell Descriptions – EP 15 Werrina

### Opportunities (Field visits and local reports)

Opportunity for DEW, EP Landscape Board to work with the landholders to develop and implement coastal management plans, with particular emphasis on revegetation, pest plant and animal control and access control.

### Conservation Analysis (GIS)

The total of conservation means, 83.72 is low for the region. Detailed summary mapping shows generally medium low totals, as suggested by the means total, but dune areas score medium high totals, and samphire swamp and Pleistocene dunes have medium low values; cleared land gives very low totals. High value sets for the cell included coastal dune plant association rarity and coastal dune endemic plants (both have high values throughout the cell), number of threatened mammal species, viewshed, viewscape and vegetation block metrics. Several other data sets give significant values: status of threatened fauna (above average values, except in the saline lowlands west of the Driver River – see photo above), number of threatened species, species richness medium low throughout), number of threatened birds (high values in lowlands near the Driver River – including focal species Pied Oystercatcher), and wetland significance (wetlands near the Driver River are listed as in moderate condition, but as having no national significance).

The 2019 review showed only two additional native flora species recorded since the 2011 data analysis. No additional weed species were recorded – the only unique weed species being due to a taxonomic name change (Pimpernel, *Angallis arvensis* has changed to *Lysimachia arvensis*). The total number of flora species records remains the same at 59 as two records have since been removed in a BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of eight additional native fauna species recorded compared with two in the 2011 analysis, bringing the total number of native fauna species to 10, but no additional non-indigenous species. If the analysis were repeated for this cell, with only slight increases in flora and fauna species richness, the conservation rating of the cell would remain low.

### Threat Analysis (GIS)

52.197, the threat total is high for the region. The combined detailed map shows only very small scattered areas of medium low threat, elsewhere totals are well above average and the area near Cape Driver shows a concentration of very high values. The principal threats shown by high average scores are: ORV activity, land ownership, land use, viewshed and viewscape, vegetation block degradation, the presence of dangerous weeds (very high score), and dune instability.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, with reports that this activity has resulted in increased vegetation degradation. There are no additional weed records. The threat rating would remain high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or local development planning; however, there are strategic implications for planning.



## Cell Descriptions – EP 15 Werrina

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Narrow high tide beaches locally lost in storms; Marked erosion of soft rock cliffs.	Initiate a cliff recession survey marker system, to manage cliff recession.	
2070: +c.80cm	Pocket beaches below cliffs lost by sand removal to nearshore; Dunes near the mouth of the River Dutton recede rapidly following foredune erosion.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides. 2070: Storm tide flooding in the floodplain of the lower Dutton River.		
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Dutton River potentially susceptible to local intense storm run-off, with potential to deliver large quantities of channel and flood plain sediments to the nearshore zone.	Catchment management response as necessary to manage soil assets.	



## Cell Descriptions – EP 15 Werrina

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Groundwater lowering; saline incursion:</b>	Rising sea level increases saline groundwater pressure in low lying areas near the shoreline, with local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.64 Recommended Actions and Priority for EP15 Werrina**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and with the potential for low cliff erosion.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (threat)	DEW, EP Landscape Board
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, DC Tumby Bay/DC Cleve, community
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board

## Cell Descriptions – EP 15 Werrina

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage.	High (cons/ threat)	DEW, EP Landscape Board, Birds Australia DC Tumby Bay/DC Cleve community
Saltmarsh	Incomplete saltmarsh mapping in this area.	Undertake saltmarsh mapping project as a baseline for adaptive management.	High (cons)	DEW, EP Landscape Board
Dunes at the mouth of the Driver River	These dunes have medium/high conservation values and are threatened by weeds and ORV activity.	Unalienated Crown land needs a local weed and access management plan.	High (cons/threat)	EP Landscape Board
All vegetated areas	All vegetated areas have been shown to include dangerous weeds.	Devise a strategic plan to sequentially reduce the weed threat in this cell.	High (cons/threat)	EP Landscape Board, landowners
Saline wetlands near the floodplain and mouth of the Driver River	This occasionally flooded lowland is a valuable habitat for numbers of threatened bird species, including the Pied Oystercatcher, a focal species: Currently there is no protection for this area.	Engage with landholder to devise the most appropriate way of protecting this valuable habitat, for example a Vegetation Heritage Agreement involving help with management action.	High (cons/ threat)	EP Landscape Board, landowners

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	687.76 ha (56.95 % of the cell)
<b># flora surveys / records</b>	2 (5*) surveys, 0 (0*) opportune sites, 2 (2*) Herbarium records
<b># flora in cell</b>	59 (59*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	19 (21*)
<b>Significant CDCS floristic community</b>	<i>Eucalyptus incrassata</i> mallee – 100% of SA records in EP <i>Melaleuca lanceolata</i> / <i>Tetragonia implexicoma</i> shrubland – 72% of SA records in EP <i>Olearia axillaris</i> / * <i>Lycium ferocissimum</i> shrubland – 8% of SA records in EP
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Arctotheca calendula</i>	Cape Weed		1
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus rubens</i>	Red Brome		2
<i>Hordeum glaucum</i>	Blue Barley-grass		1
<i>Hypochaeris glabra</i>	Smooth Cat's Ear		2
<i>Hypochaeris radicata</i>	Rough Cat's Ear		3
<i>Hypochaeris</i> sp.	Cat's Ear		1
<i>Isolepis marginata</i>	Little Club-rush		0
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		2
<i>Medicago minima</i>	Little Medic		1
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Schismus barbatus</i>	Arabian Grass		0
<i>Sonchus oleraceus</i>	Common Sow-thistle		0
<i>Urtica urens</i>	Small Nettle		0
<i>Vulpia myuros</i> f. <i>myuros</i>	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, species just remained since 2011

## Cell Descriptions – EP 15 Werrina

### Native flora

Species	Common Name	Aus status	SA status
<i>Alyxia buxifolia</i>	Sea Box		
<i>Brachyscome lineariloba</i>	Hard-head Daisy		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Calandrinia</i> sp.	Purslane/Parakeelya		
<i>Carpobrotus rossii</i> (NC)	Native Pigface		
<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel		
<i>Clematis microphylla</i> var. <i>microphylla</i> (NC)	Old Man's Beard		
<i>Crassula colligata</i> ssp. <i>lamprosperma</i>			
<i>Crassula colorata</i> var. <i>colorata</i>	Dense Crassula		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus gracilis</i>	Yorrell		
<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee		
<i>Eucalyptus socialis</i> (NC)	Beaked Red Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Exocarpos sparteus</i>	Slender Cherry		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Gramineae</i> sp.	Grass Family		
<i>Helichrysum leucopsidium</i>	Satin Everlasting		
<i>Lomandra leucocephala</i> ssp. <i>robusta</i>	Woolly Mat-rush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree		
<i>Melaleuca uncinata</i>	Broombush		
<i>Muehlenbeckia adpressa</i>	Climbing Lignum		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Parietaria debilis</i>	Smooth-nettle		
<i>Parietaria debilis</i> (NC)	Smooth-nettle		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Rhagodia preissii</i> ssp. <i>preissii</i>	Mallee Saltbush		
<i>Senecio glossanthus</i> (NC)	Annual Groundsel		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Thryptomene micrantha</i>	Ribbed Thryptomene		
<i>Thysanotus patersonii</i>	Twining Fringe-lily		
<i>Trachymene pilosa</i>	Dwarf Trachymene		
<i>Triglochin calcitrapum</i> (NC)	Spurred Arrowgrass		
<i>Triodia</i> sp. (NC)	Spinifex		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	10 (2*) recorded – 10 (2*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 17* reptiles and 26* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 1 (0*) opportune sites
<b># of threatened fauna in cell</b>	0 (0*)

## Cell Descriptions – EP 15 Werrina

**# of non-indigenous fauna** 0 (0\*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Artamus personatus</i>	Masked Woodswallow		
<i>Artamus superciliosus</i>	White-browed Woodswallow		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Larus pacificus</i>	Pacific Gull		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Belenois java tautonia</i>	Caper White	Mi	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p

## Cell Descriptions – EP 15 Werrina

Species	Common Name	Status*	Record
<i>Theclinessthes albocincta</i>	Bitter-bush Blue		p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammals recorded in 2019 data or in 2011 data.

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Hemiergis peronii</i>	Four-toed Earless Skink			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lialis burtonis</i>	Burton's Legless Lizard			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pygopus lepidopus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

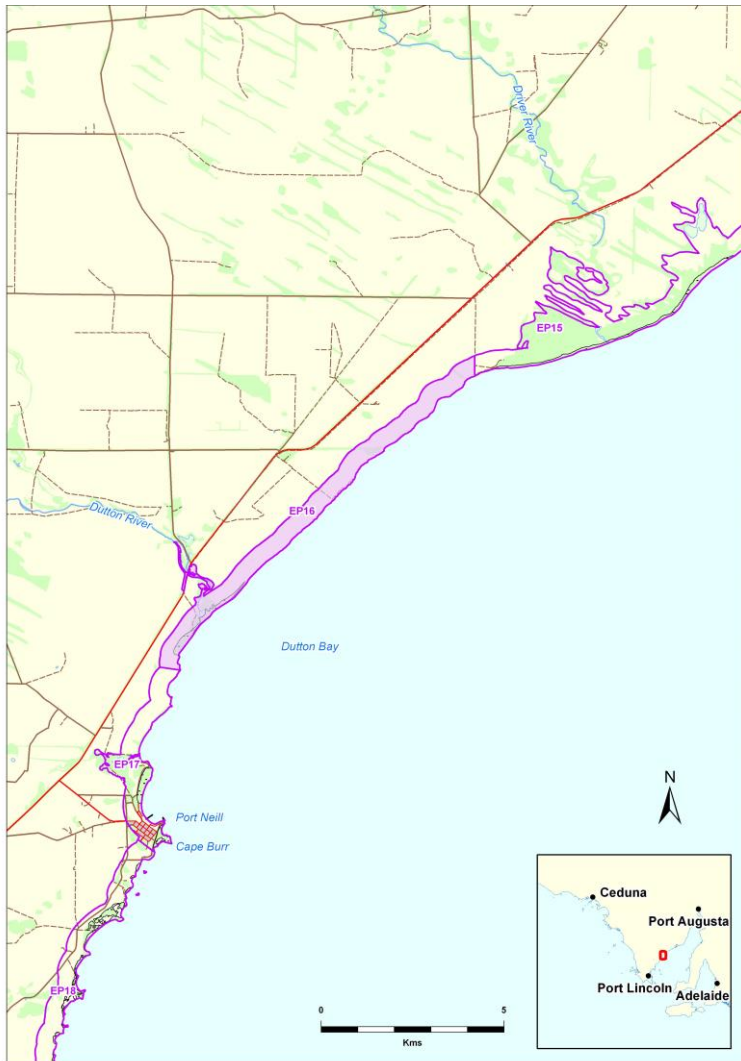
R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibians recorded in 2019 data or in 2011 data.

**Cell EP 16 Dutton Bay**

Cell area 634.04 ha. Shoreline length 12 km.



Landforms

The cell comprises an undulating coastal plain underlain by Pleistocene sands and clays, over basement rocks. The shoreline is low energy, white coarse sand, narrow high tide beaches, and backed by low cliffs and bluffs and occasional dune ramps; beaches are fronted by sand flats and, from Dutton River to the north east, basement rock platforms. In places the platforms are 50m+ wide. Near the Dutton River the low Pleistocene bluffs form a shallow embayment, in filled by low Holocene dunes. The lower flood plain of the Dutton River forms a partially blocked small estuary, with sand ridges and salt marsh. In the far north east of the cell outcrops of basement rocks, in low rises, are found within the coastal boundary; here also remnant red sands from Pleistocene arid dunes are seen. In the middle (approx.) of the cell there is 2.5 of basement platform

and basement low cliff.

Benthic Habitat

National benthic mapping shows sections of Dutton Bay as dense seagrass; no state benthic mapping for this section of coast.

Biota

Remnant vegetation covers an area of, 75.7 only 11% of the cell. There are two flora survey sites, one herbarium flora record site, one opportune flora survey site and five opportune fauna survey sites. Holocene dunes near the mouth of the Dutton River, and a small area of red sand cliff top dunes 6km north of the river mouth, are *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland. Fringing the salinised flats of the Dutton River floodplain is *Eucalyptus dumosa* (mixed) mallee woodland and *Melaleuca lanceolata* shrubland >1m.



## Cell Descriptions – EP 16 Dutton Bay

### Land Use/ Land Ownership

Traditional lands of the Barngarla people.

There is a very narrow reserve of unalienated Crown land across the whole of this cell; this is at its widest in the dunes at the mouth of the Dutton River. Much of this cell has been cleared and is cropped to the edge of the low cliff.



**FIGURE 6.69** Sedimentation at the mouth of the Dutton River. Photo: Coast Protection Board, 2018

### Uses (Field visits and local reports)

Conservation – Crown land strip most of cell.

Agriculture – Cropping, grazing.

Recreation & Tourism – Nature, ORV use (four-wheel drive, motorbike).

### Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Australian Pied Oyster Catcher).

### Threats (Field visits and local reports)

Agriculture – Grazing (sheep observed in coastal reserve).

Uncontrolled access – ORV use, informal camping, firewood collection leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Feral animals – Foxes, cats, rabbits.

Weed infestation – African Boxthorn.



## Cell Descriptions – EP 16 Dutton Bay

### Opportunities (Field visits and local reports)

Coastal management plans could be developed and implemented through collaboration with DEW, EP Landscape Board, local landholders and local government (DC Tumby Bay/DC Cleve), with particular emphasis on pest plant and animal control and access control including stock access.

Current monitoring program for the Hooded Plover and other beach nesting bird monitoring is being conducted in a small portion of the cell with but no Hooded Plover sightings have been recorded in recent surveys since the 2012 survey.

Continue shorebird monitoring program through biennial count monitoring. Opportunity to increase Hooded Plover territory monitoring during the nesting season to determine if the site becomes occupied from neighbouring territories.

### Conservation Analysis (GIS)

The sum of conservation means, 50.67, is low for the region. The distribution of conservation values is straightforward, as almost the entire cell shows low total values. The exception is the floodplain of the lower Dutton River and adjacent dunes: here medium-low values are found, and in the dunes immediately south of the river medium values prevail. The dunes and floodplain at the mouth of the Dutton River record high values for endemic floristic vegetation, number of threatened species, habitat for threatened bird species; habitat for focal species Pied Oystercatcher (beach and tidal inlet), Beach Slider (dunes) and Bight Coast Skink (dunes).

The 2019 review showed an increase with seven additional native flora species recorded, since the 2011 data, and six additional weed species record, with a total number of 41 flora species records by 2019. The only unique weed species record was due to a taxonomic name change (Pimpernel, *Angallis arvensis* which has changed to *Lysimachia arvensis* so has not increased the total number of records. The 2019 review showed an increase of 27 additional native fauna species recorded since the 2011 analysis as well as one additional non-indigenous species. Four of the new fauna records include species with a conservation rating - the Sooty Oystercatcher *Haematopus fuliginosus* and the Pied Oystercatcher *Haematopus longirostris* both listed as rare under the *National Parks and Wildlife Act 1972* (NPW Act), the Pacific Golden Plover *Pluvialis fulva*, listed as rare under the NPW Act and the Hooded Plover (Hooded Dotterel) *Thinornis cucullatus*, listed as vulnerable under the NPW Act and the *Environment Protection and Biodiversity Conservation Act 1999*. If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased, it is unlikely that this would be enough to raise the conservation rating of the cell to medium.

### Threat Analysis (GIS)

The distribution of total threat values shows medium to medium-high values throughout; these totals rise slightly near the mouth of the Dutton River. Thus locally the dunes immediately south of the river are a management issue, since the medium conservation values are paired with medium-high threat values. Land ownership and land use, viewshed and viewscape, vegetation block degradation and dangerous weeds, off road vehicle activity (in Dutton River mouth dunes, along the low cliffs and where tracks lead from road to the coast) are above average threat layers, the latter 3 more significant because of the small proportion (12%) of remnant vegetation within the cell.

Threats from ORV impacts within dunes near the Dutton River mouth compounded by reports of stock incursions from neighbouring properties. These activities have led to increased

## Cell Descriptions – EP 16 Dutton Bay

vegetation degradation within this small patch of remnant vegetation. There were also six additional weed species recorded. The threat rating would remain medium.

### *Adaptation to Climate Change Threats*

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030 : +c.20cm	Narrow high tide beaches locally lost in storms; Marked erosion of soft rock cliffs.	Initiate a cliff recession survey marker system, to manage cliff recession.	
2070: +c.80cm	Pocket beaches below cliffs lost by sand removal to nearshore; Dunes near the mouth of the Dutton River recede rapidly following foredune erosion.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; 2070: storm tide flooding in the floodplain of the lower Dutton River.		
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	

## Cell Descriptions – EP16 Dutton Bay

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Dutton River potentially susceptible to local intense storm run-off, with potential to deliver large quantities of channel and flood plain sediments to the nearshore zone.	Catchment management response as necessary to manage soil assets.	
<b>Groundwater lowering; saline incursion:</b>	Rising sea level increases saline groundwater pressure in low lying areas near the shoreline, with local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to 0.6°C 2070: +1.0°C to 1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.65 Recommended Actions and Priority for EP16 Dutton Bay**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and with the potential for low cliff erosion;	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution;	High (cons/threat)	DEW, EP Landscape Board
	Dunes and floodplain at the mouth of the Dutton River have high conservation values and are threatened by weeds and ORV activity.	Unalienated Crown land needs a local weed and access management plan.	High (cons/threat)	EP Landscape Board

## Cell Descriptions – EP16 Dutton Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, DC Tumby Bay/DC Cleve, community
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board
	Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage where appropriate.	High (cons/ threat)	DEW, EP Landscape Board, Birds Australia DC Tumby Bay/DC Cleve, community
	Sheep from adjoining properties observed in coastal reserve. Impact on sensitive coastal features and increased vegetation degradation.	Sheep observed in coastal reserve, work with landholders to maintain fencing.	Medium (cons/threat)	landowners, DEW, EP Landscape Board

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	75.69 (11.94% of the cell)
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## Cell Descriptions – EP16 Dutton Bay

<b># flora surveys / records</b>	2 (1*) surveys, 1 (0*) opportune sites, 1 (2*) Herbarium records
<b># flora in cell</b>	41 (30*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	20 (17*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Aizoon pubescens</i>	Coastal Galenia		-
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avellinia michelii</i>	Avellinia		0
<i>Avena barbata</i>	Bearded Oat		2
<i>Avena sp.</i>	Oat		2
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus rubens</i>	Red Brome		2
<i>Cakile maritima ssp. maritima</i>	Two-horned Sea Rocket		2
<i>Lolium rigidum</i>	Wimmera Ryegrass		1
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		2
<i>Medicago minima</i>	Little Medic		1
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Salvia verbenaca var.</i>	Wild Sage		-
<i>Schismus barbatus</i>	Arabian Grass		0
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia baekeoides</i>	Hakea Wattle		
<i>Atriplex cinerea</i>	Coast Saltbush		
<i>Crassula colorata var. colorata</i>	Dense Crassula		
<i>Crassula sieberiana ssp. tetramera (NC)</i>	Australian Stonecrop		

## Cell Descriptions – EP16 Dutton Bay

Species	Common Name	Aus status	SA status
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus dumosa</i> complex	White Mallee		
<i>Eucalyptus</i> sp.			
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Gramineae</i> sp.	Grass Family		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca uncinata</i>	Broombush		
<i>Myoporum insulare</i>	Common Boobialla		
<i>Nitraria billardiarei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Santalum acuminatum</i>	Quandong		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Tecticornia indica</i> ssp.	Brown-head Samphire		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	27 (2*) recorded – 27 (2*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 17* reptiles and 26* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 5 (1*) opportune sites
<b># of threatened fauna in cell</b>	5 (0*)
<b># of non-indigenous fauna</b>	1 (0*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Blue = recorded in 2019, new since 2011

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Chalcites basalus</i>	Horsfield's Bronze Cuckoo		

Cell Descriptions – EP16 Dutton Bay

Species	Common Name	Aus status	SA status
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Pluvialis fulva</i>	Pacific Golden Plover		R
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

**Butterflies**

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinesibes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesibes serpentata serpentata</i>	Salt-bush Blue	LC	p

## Cell Descriptions – EP16 Dutton Bay

Species	Common Name	Status*	Record
<i>Ziŕina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammals were recorded in 2011 or 2019.

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Hemiergis peronii</i>	Four-toed Earless Skink			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Lialis burtonis</i>	Burton's Legless Lizard			c
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

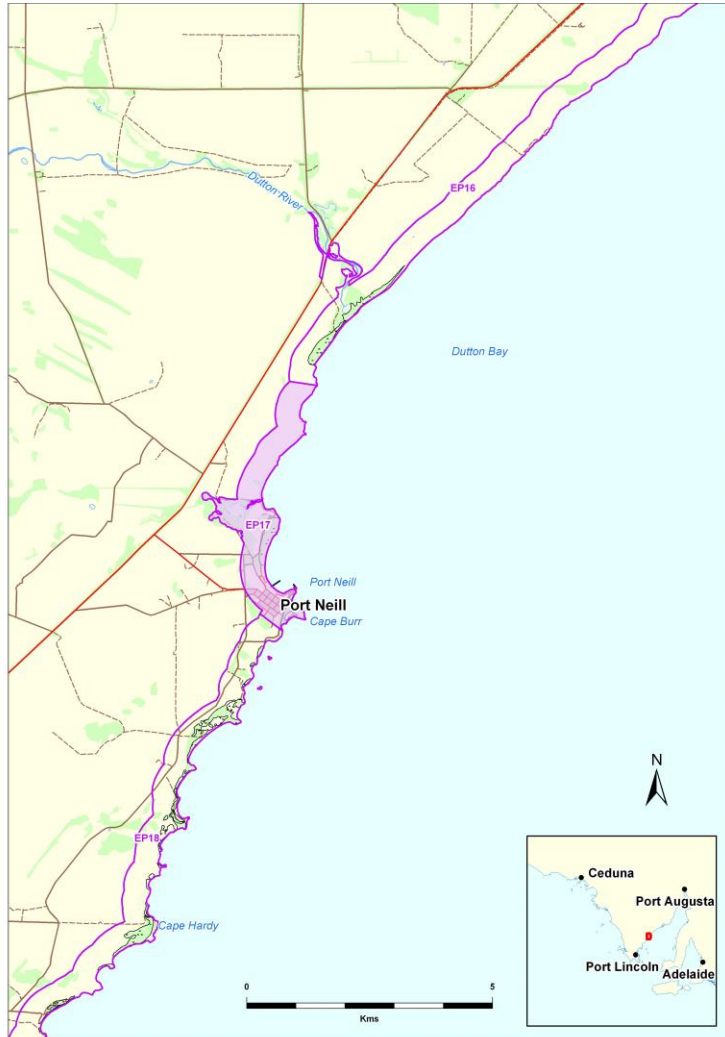
### Amphibians

No amphibian species recorded in 2011 or 2019.



**Cell EP 17 Port Neill**

Cell area 332.38 ha. Shoreline length 7.2 km.



Landforms

The cell is low-lying undulating Pleistocene limestone (calcarenite) and sands over basement rock. The shore runs north northeast in a series of shallow embayments between basement headlands and platforms. Port Neill is at the southern end of a small, low energy, zeta curve beach that runs north from Cape Burr; this and the next small embayment to the north have retained Holocene sands in beaches and low barrier dunes. There are small areas of Holocene dunes and narrow beaches, of fine sand in the south, coarse in the north. Cape Burr is calcarenite over basement, with a thin covering of cliff top white sand dunes. Backing the dunes at Mottled Cove and at its northern headland are back barrier saline lowlands, salt lakes and depressions with sandy clay or sandy clay loam soils.

Benthic Habitat

National benthic mapping indicates dense seagrass; aerial photography

supports this. There is no state benthic mapping for this section of coast.

Biota

Remnant vegetation covers an area of 117 ha, 35 % of the cell. There are 14 herbarium flora record sites, one flora survey site, one opportune flora survey site and 21 opportune fauna survey sites within the cell. Dunes are in *Olearia axillaris* (mixed) tall open shrubland over *Threlkeldia diffusa* (mixed) low shrubs and *Muehlenbeckia adpressa* (mixed) low vines. Areas backing the dunes, including higher dunes, have remnant mallee woodland: *Eucalyptus incrassata* mid mallee woodland over *Melaleuca uncinata* (mixed) mid shrubs and *Calytrix involucrata* low shrubs and *Schoenus racemosus* (mixed) low sedges. Back barrier saline lowlands are partly vegetated in sapphire low shrubland: *Tecticornia indica* ssp. *leiostachya*, *Atriplex vesicaria* ssp. shrubland <1m.

Land Use/ Land Ownership

Traditional lands of the Barngarla people.

## Cell Descriptions – EP 17 Port Neill

There is a very narrow reserve of unalienated Crown land in the northern third of the cell, and Crown land dedicated to the Care and Control of the District Council of Tumby Bay in the remaining southern section, widening to encompass dune systems. The township of Port Neill is located on the southern edge of the Cell.



**FIGURE 6.70 Cape Burr and township of Port Neill. Photo: Coast Protection Board, 2018**

### Uses (Field visits and local reports)

Township – Port Neill.

Conservation – Council’s coastal reserves.

Agriculture – Cropping, grazing.

Commercial fishing – Fishing charters.

Recreation & Tourism – Caravan park, shacks, sightseeing, nature, hiking, swimming, surfing, snorkelling, recreational fishing, camping (informal – lookout, Surfer’s Beach), dog walking, ORV use (four-wheel drives and motorbikes on beaches), sand boarding in dunes, boating, sailing, water skiing, jet skis.

Boat launching – Beach.

### Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Rock Parrots, Hooded Plovers).

### Threats (Field visits and local reports)

Agriculture – Grazing.

Pollution – Garden waste dumping, marine debris, septic waste overflow (historical issue – has recently been addressed by installation of new effluent scheme for town).

Weed infestation – Roadsides and coastal areas adjacent homes caused by garden escapees; Large succulent infestation due to garden waste dumping; African Boxthorn and Acacia Cyclops.

## Cell Descriptions – EP 17 Port Neill

Feral animals – Foxes, cats, rabbits (annual baiting program for rabbits around town).

Uncontrolled access – Sand boarding (historically led to dune erosion), vehicles – speeding and hoon behaviour, track creation and informal camping causing risk to beach users, disturbance of shorebirds, and destruction of vegetation and samphire destruction at Byrnes Bay Creek.

Future development – residential development if nearby Mining Port is developed.

### Opportunities (Field visits and local reports)

Opportunity for coastal management plans to be developed and implemented through collaboration with DEW, EP Landscape Board, Residents Association, community groups and local government (DC Tumby Bay), with particular emphasis on revegetation, pest plant (garden escapes) and animal control, access control and stormwater management. Activities associated with the plans could be rolled out through schools, businesses, Residents Association and other community groups.

Extension of current shorebird community awareness raising program; continue Hooded Plover biennial count survey and Hooded Plover nesting territory monitoring; work with local landholders to manage introduced threats at known Hooded Plover nesting sites.

On-ground projects – completion of foreshore rehabilitation with District Council of Tumby Bay.

### Conservation Analysis (GIS)

81.44 is the total for conservation means: this is a low total for the region. The distribution of these values is shown by the detailed conservation summary layer: the dunes backing the small embayment running north from Port Neill show medium/medium-high totals, similarly the cliff top dunes at Cape Burr; the back barrier saline lowlands have low-medium totals; the cultivated lands have low totals. There are a number of layers with above average totals, though there are few contributions from other layers; the contributing layers are: rarity of CDCS plant associations, priority for threatened fauna, endemic plant associations, species richness, habitat for threatened bird species, number of bird species, and habitat for threatened mammal species.

The 2019 review showed an increase of one additional native flora species recorded, since the 2011 analysis, and seven additional weed species records, with a total number of 83 flora species records by 2019. An additional unique native flora species record was due to a taxonomic name change (Forked Spyridium, *Spyridium bifidum* var *bifidum*, which has changed to *Spyridium stenophyllum* ssp. *renovatum* so has not increased the total number of records. Three flora and four fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of eight additional native fauna species recorded since the 2011 analysis bringing the total number of fauna to 97 compared with 89 in 2011 and one additional non-indigenous species. Three of the new fauna records include species with a conservation rating - the Brown Quail, *Coturnix ypsilophora*, listed as Vulnerable under the *National Parks and Wildlife Act 1972* (NPW Act), the White-bellied Sea Eagle *Haliaeetus leucogaster*, listed as Endangered under the NPW Act and the Black-browed Albatross, *Thalassarche melanophris*, listed as Vulnerable under the NPW Act and the *Environment Protection and Biodiversity Conservation Act 1999*. If the analysis were repeated for this cell, the increase in flora species richness and number of threatened bird species, would place this cell close to achieving a medium conservation rating.

## Cell Descriptions – EP 17 Port Neill

### Threat Analysis (GIS)

The total of threat means is 52.203, high for the region. Port Neill, Cape Burr and the next headland (unnamed) to the north all show a large extent of high threat totals; the rest of the cell shows medium values. Only very small parts of cell EP 17 have a low threat total.

As with cells further north, ORV activity (dunes, cliff tops, and back barrier swamps) and vegetation block degradation are high, although there are fewer dangerous weeds in this area than further north; at Cape Burr and the next headland, and immediately SW of Port Neill >20% of the flora species are exotic. High threat totals are found in the following layers: viewshed and viewscape, land ownership and land use, and also existing development are noteworthy.

It is likely that the area impacted by ORV and informal campsites has increased since 2011, with reports that this activity has resulted in increased vegetation degradation around the northern half of Mottled Cove, Cape Burr and samphire at Byrnes Bay Creek. There were also seven additional weed species records, two of which are Declared weeds – *Gazania*, *Gazania linearis*, and White Weeping Broom, *Retama raetam*. The threat rating would remain high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession throughout and dune instability at Mottled Cove and neighbouring embayments due to foredune damage; Increase in dune mobility.	Active management of dunes; Consider possible retreat buffer zones for dunes - re-zoning on land use and development plans needed.	
2070: +c.80cm	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore; erosion at soft rock cliffs.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale;	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	

Cell Descriptions – EP 17 Port Neill

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<i>Intensity</i> of large storms increases			
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Rare flood run-off may deliver sediment down Byrnes Bay Creek raising coastal swamp land levels as well as increased coastal erosion due to creek flooding.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes;  Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and habitat survival and change in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.66 Recommended Actions and Priority for EP17 Port Neill**

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and back barrier samphire swamps.	Create a baseline for monitoring shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	ORV impact on dunes, samphire habitats.	Manage ORV activity in moderate/high conservation value dunes at the northern half of Mottled Cove, Cape Burr and samphire at Byrnes Bay Creek. Review existing tracks with a view to rationalising unnecessary tracks. Implement actions to control and /or exclude off-road vehicle activity.	Medium (cons/threat)	EP Landscape Board, DEW, DC Tumby Bay, community
	As sea level rise accelerates, dunes with beach connection are increasingly affected by storm foredune damage and blowout development, leading to dune recession.	Active dune management to slow de-stabilisation.	Medium (cons/threat)	EP Landscape Board
	Increasing aridity encourages grassy weed invasion of all dunes; existing exotic species and dangerous weed impact exacerbated.	Active weed management.	High (cons/threat)	EP Landscape Board
	Weed species identified throughout cell (see Port Neil section for garden escapees).	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/threat)	EP Landscape Board, landowners, DEW, DC Tumby Bay, community

## Cell Descriptions – EP 17 Port Neill

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal and formal camping with impact from multiple tracks, soil compaction and soil erosion, vegetation damage and trampling and removal, fauna disturbance, increased fire risk, firewood collection and weed introduction.	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/ infrastructure. Install and/or maintain signage.	Medium (cons/threat)	EP DC Lower Eyre, DEW, DC Tumby Bay, SA Tourism community, landowners
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, DC of Tumby Bay.
	Stormwater management.	Township could use infrastructure upgrades such as rain gardens to improve water quality as it enters the ocean.	Medium (threat)	Council, EP Landscape Board, community
	Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from increased human activities within the township including impacts from pets, agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, Review development plan zoning to these areas to increase protection. Community education programs.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia, DC Tumby Bay, community

## Cell Descriptions – EP 17 Port Neill

Component	Issue	Proposed Action	Priority of Action	Key Players
		Install interpretive/ educational signage.		
Port Neil Shack area	Garden escapees, particularly succulents.	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants.	Medium (cons/threat)	DEW EP Landscape Board DC Tumby Bay, community

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	117.35 ha (35.31 % of the cell)
<b># flora surveys / records</b>	1 (2*) surveys, 1 (0*) opportune sites, 14 (6*) Herbarium records
<b># flora in cell</b>	83 (79*)
<b># conservation rated flora in cell</b>	2 (2*)
<b># non-indigenous flora in cell</b>	26 (20*)
<b>Significant CDCS floristic community</b>	<i>Eucalyptus</i> spp. / <i>Melaleuca lanceolata</i> / <i>Melaleuca uncinata</i> mallee – 89% of SA records in EP <i>Olearia axillaris</i> / <i>Lasiopetalum discolor</i> shrubland – 52% of SA records in EP
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Aeonium haworthii</i>			-
<i>Aloe maculata</i>	Broad-leaf Aloe		-
<i>Argyranthemum frutescens ssp. foeniculaceum</i>	Teneriffe Daisy		4
<i>Asparagus asparagoides f.</i>	Bridal Creeper	D, RA	9
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avellinia michelii</i>	Avellinia		
<i>Avena barbata</i>	Bearded Oat		2
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus diandrus</i>	Great Brome		2
<i>Bromus rubens</i>	Red Brome		2
<i>Cotyledon orbiculata var. orbiculata</i>	Pig's Ear		1
<i>Euphorbia paralias</i>	Sea Spurge	RA	5



## Cell Descriptions – EP 17 Port Neill

Species	Common Name	Status	Study rating
<i>Gazania linearis</i>	Gazania	D	-
<i>Hypochoeris glabra</i>	Smooth Cat's Ear		2
<i>Limonium sinuatum</i>	Notch-leaf Sea-lavender		3
<i>Lolium rigidum</i>	Wimmera Ryegrass		1
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		2
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Pelargonium peltatum</i>	Ivy-leaf Pelargonium		-
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Retama raetam</i>	White Weeping Broom	D	3
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Schinus molle</i>	Pepper-tree		
<i>Sonchus oleraceus</i>	Common Sow-thistle		

D: Declared weed, RA: Red alert weed  
 Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia cupularis</i>	Cup Wattle		
<i>Acacia cyclops</i>	Western Coastal Wattle		
<i>Austrostipa echinata</i>	Spiny Spear-grass		R
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Austrostipa exilis</i>	Heath Spear-grass		
<i>Calandrinia calyptata</i>	Pink Purslane		
<i>Calytrix involucreta</i>	Cup Fringe-myrtle		
<i>Carpobrotus rossii</i>	Native Pigface		
<i>Chrysocephalum apiculatum</i>	Common Everlasting		
<i>Clematis microphylla</i> var. <i>microphylla</i>	Old Man's Beard		
<i>Crassula colorata</i> var. <i>colorata</i>	Dense Crassula		
<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Dodonaea hexandra</i>	Horned Hop-bush		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus angulosa</i>	Coast Ridge-fruited Mallee		
<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Gabnia deusta</i>	Limestone Saw-sedge		
<i>Glycine rubiginosa</i>	Twining Glycine		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Hakea cycloptera</i>	Elm-seed Hakea		
<i>Helichrysum leucopsideum</i>	Satin Everlasting		
<i>Hibbertia devitata</i>	Smooth Guinea-flower		
<i>Kennedia prostrata</i>	Scarlet Runner		

## Cell Descriptions – EP 17 Port Neill

Species	Common Name	Aus status	SA status
<i>Lepidosperma concavum</i>	Spreading Sword-sedge		
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge		
<i>Leptospermum coriaceum</i>	Dune Tea-tree		
<i>Leucopogon cordifolius</i>	Heart-leaf Beard-heath		
<i>Logania limifolia</i>	Flax-leaf Logania		
<i>Lomandra leucocephala</i> ssp. <i>robusta</i>	Woolly Mat-rush		
<i>Melaleuca balmaturorum</i>	Swamp Paper-bark		
<i>Melaleuca uncinata</i>	Broombush		
<i>Microcybe multiflora</i> ssp. <i>baccharoides</i>	Scale-leaf Microcybe		
<i>Muehlenbeckia adpressa</i>	Climbing Lignum		
<i>Myoporum brevipes</i>	Warty Boobialla		
<i>Myoporum insulare</i>	Common Boobialla		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Phebalium bullatum</i>	Silvery Phebalium		
<i>Philotheca pungens</i>	Prickly Wax-flower		
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme Riceflower		
<i>Poa drummondiana</i>	Knotted Poa		R
<i>Poa poiiformis</i> var. <i>poiiformis</i>	Coast Tussock-grass		
<i>Ralfsia verrucosa</i>			
<i>Senecio pinnatifolius</i>	Variable Groundsel		
<i>Spyridium stenophyllum</i> ssp. <i>renovatum</i>	Forked Spyridium		
<i>Stenanthemum leucophractum</i>	White Cryptandra		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Thysanotus patersonii</i>	Twining Fringe-lily		
<i>Trachymene cyanopetala</i>	Purple Trachymene		
<i>Trachymene pilosa</i>	Dwarf Trachymene		
<i>Triodia scariosa</i>	Spinifex		
<i>Wahlenbergia preissii</i>			
<i>Wahlenbergia stricta</i> ssp. <i>stricta</i>	Tall Bluebell		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	97 (89*) recorded – 82 (76*) birds, 13 (13*) reptiles, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 11* reptiles and 25* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 21 (15*) opportune sites
<b># of threatened fauna in cell</b>	11 (9*)
<b># of non-indigenous fauna</b>	6 (5*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

**Non-indigenous fauna**

Species	Common Name	Class	Record
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Spilopelia chinensis</i>	Spotted Dove	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grundl.

Blue = recorded in 2019, new since 2011

**Birds**

Species	Common Name	Aus status	SA status
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Accipiter cirrocephalus cirrocephalus</i>	Collared Sparrowhawk		
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas castanea</i>	Chestnut Teal		
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Artamus personatus</i>	Masked Woodswallow		
<i>Artamus leucorhynchus</i>	White-browed Woodswallow		
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Cacomantis pallidus</i>	Pallid Cuckoo		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Chalcites lucidus</i>	Shining Bronze Cuckoo		
<i>Chalcites osculans</i>	Black-eared Cuckoo		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Circus assimilis</i>	Spotted Harrier		
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Coturnix ypsilophora</i>	Brown Quail		V
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Cygnus atratus</i>	Black Swan		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albigularis</i>	White-fronted Chat		
<i>Epthianura tricolor</i>	Crimson Chat		
<i>Falco berigora</i>	Brown Falcon		

Cell Descriptions – EP 17 Port Neill

Species	Common Name	Aus status	SA status
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Geopelia placida</i>	Peaceful Dove		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Hirundapus caudacutus</i>	White-throated Needletail		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Lalage tricolor</i>	White-winged Triller		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus leucopterus</i>	White-winged Fairywren		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Melopsittacus undulatus</i>	Budgerigar		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Milvus migrans</i>	Black Kite		
<i>Nymphicus hollandicus</i>	Cockatiel		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pardalotus punctatus</i>	Spotted Pardalote		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Parvipsitta porphyrocephala</i>	Purple-crowned Lorikeet		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax carbo</i>	Great Cormorant		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sugomel niger</i>	Black Honeyeater		
<i>Thalassarche melanophris</i>	Black-browed Albatross	V	ssp
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		
<i>Todiramphus sanctus</i>	Sacred Kingfisher		
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p

## Cell Descriptions – EP 17 Port Neill

Species	Common Name	Status*	Record
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammals were recorded in 2011 or 2019.

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Christinus marmoratus</i>	Marbled Gecko			
<i>Diplodactylus vittatus complex (NC)</i>	Stone Geckos			
<i>Hemiergis peronii</i>	Four-toed Earless Skink			
<i>Lerista dorsalis</i>	Southern Four-toed Slider			
<i>Lialis burtonis</i>	Burton's Snake-lizard			
<i>Morethia adelaidensis</i>	Adelaide Snake-eye			
<i>Parasuta spectabilis</i>	Mallee Black-headed Snake			
<i>Pogona barbata</i>	Eastern Bearded Dragon			
<i>Pogona vitticeps</i>	Central Bearded Dragon			
<i>Pseudonaja inframacula</i>	Peninsula Brown Snake			
<i>Pygopus lepidopus</i>	Common Scaly-foot			
<i>Tiliqua occipitalis</i>	Western Bluetongue			
<i>Tiliqua rugosa</i>	Sleepy Lizard			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

Blue = recorded in 2019, new since 2011

**Amphibians**

No amphibians were recorded in 2011 or 2019.

### Cell EP 18 Cape Hardy

Cell area 984.17 ha. Shoreline length is 24.3 km.



#### Landforms

This lengthy cell runs from Cape Burr to Lipson Island and the coastal boundary maintains the default 500m throughout. North of Kiandra Road the cell is an undulating coastal plain of calcarenite and Pleistocene red sands that form a thin veneer over basement rocks (Donnington Suite, Lincoln Complex, granite, gneiss, gabbro). The southern part of the cell is entirely within basement rocks, showing many dry fluvial valleys that form first and second order networks leading to the sea. The shoreline maintains overall alignment, but in detail is an alternation of rocky cliffs and headlands and cliffs with small beaches and rocky coves, low cliff/ bluffs and basement rock platforms and small sheltered medium-sand beaches. More Holocene sand is stored in the northern half of the cell, with larger beaches, clifftop dunes and sand ramps over bluffs; in contrast to the pocket beaches and lack of dunes in the south. The beach immediately

north of Lipson Island has a beach and low to absent dunes and two small intermittent lagoons at the southern end. Many nearshore basement rock reefs and islets are also present.

#### Benthic Habitat

Basement reefs near Cape Burr; elsewhere inshore reefs, sand, then dense seagrass.

#### Biota

Remnant vegetation covers an area of 25% of this cell; 11% of the cell are sand dunes. There are five herbarium flora record sites, four flora survey sites, six opportune flora survey sites, three fauna survey sites, 28 opportune fauna survey sites within the cell and one threatened plant population record site.

Much of the scattered remnant vegetation low open tussock grassland, with *Lomandra effusa*, *Austrostipa nitida*, *Austrodanthonia caespitosa*, *Enneapogon nigricans*, *Austrostipa eremophila*. The dunes are mapped as *Leucopogon parviflorus*, +/- *Olearia axillaris* mid open shrubland over *Rhagodia candolleana* ssp. *candolleana*, *Isolepis nodosa*, *Lepidosperma gladiatum*, +/- *Lasioptelum discolor* low shrubs over *Carpobrotus rossii*.



## Cell Descriptions – EP 18 Cape Hardy

### Land Use/ Land Ownership

Traditional lands of the Barngarla people.

There is a very narrow strip of Crown land along most of the length of the cell, excluding a central section. 12% of the cell is unalienated Crown land.



**FIGURE 6.71 Cape Hardy, looking south. Photo: Coast Protection Board, 2018**

### Uses (Field visits and local reports)

Conservation – Local council coastal reserves and Crown land reserves.

Agriculture – Cropping, grazing.

Commercial fishing.

Recreation & Tourism – Sightseeing, nature, hiking, swimming, body surfing, snorkelling, fishing, cockling, camping (formal at Lipson Cove; informal at Carrow Wells, Kiandra Beach, Rogers Beach, Ponto Beach), dog walking on beaches, ORV use (four-wheel drive, motorbikes), boating, jet skis.

Boat launching – Rogers Beach, Lipson Cove.

### Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (e.g. Hooded Plovers, Rock Parrots).

Aboriginal Significant Site – Rogers Beach.

### Threats (Field visits and local reports)

Agriculture – Grazing.

Pollution – Rubbish dumping at campsites; marine debris.

Uncontrolled access – ORV use; firewood collection; encroachment outside of formal camping areas; informal camping; track creation causing destruction of vegetation; dune erosion;



## Cell Descriptions – EP 18 Cape Hardy

pollution; disturbance of shorebirds and nesting sites; private property trespassed to access beach; unmanaged access to Aboriginal Significant Site resulting in damage to site; ORV use on beaches causing Hooded Plover nest loss; Off-leash dogs on beaches impacting fauna.

Feral animals – Foxes, cats, rabbits.

Weed infestation – African Boxthorn; garden escapees – succulents and gazanias.

Future industrial development – Proposed shipping port for mining industry to be built at Cape Hardy and/or Cape Spencer. Impacts may include increased access to coast, potential marine water quality issues including the introduction of marine pest species and potential for oil spills, and loss of some EPBC-listed Hooded Plover nesting territories.

### Opportunities (Field visits and local reports)

Opportunity to develop and implement a coastal management plan in collaboration with DEW, EP Landscape Board and landowners, with particular emphasis on revegetation, pest plant and animal control, and access management focusing on ORVs and informal camping.

On-ground projects – access management – vehicles and camping.

Conservation – improve management and protection of bird nesting territories.

Monitoring – continue Hooded Plover biennial count and August-March nesting territory monitoring.

### Conservation Analysis (GIS)

The total of conservation means is 74.57, which is low for the region. The detailed combined conservation map shows a clear distribution of combined scores: medium to medium high scores are found on the vegetated dunes and tussock grasslands, elsewhere scores are low to low medium. High scores are found for the following: state rarity of tussock grassland and dune vegetation associations (one of the highest scores in the region); state endemism of vegetation associations (a very high score); total number of all species; number of threatened bird species and number of all species; number of threatened mammal species; viewshed and viewscape. Further contributing layers to the priority are the threatened status of fauna (medium high in many parts of the cell); and total number of threatened species.

The 2019 review showed an increase with 12 additional native flora species recorded, since the 2011 analysis, and nine additional weed species records, with a total number of 112 flora species records by the 2019 review. One of the new flora records, Hop-bush Wattle, *Acacia dodonaeifolia*, is rated Rare rating under National Parks and Wildlife Act. An additional unique native flora species record was due to a taxonomic name change Buckbush, *Salsola tragus*, which has changed to *Salsola australis* so has not increased the total number of records. Seven flora and four fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of 14 additional native fauna species recorded since the 2011 analysis and one additional non-indigenous species with a total number of 119 fauna species records by 2019 compared with 97 in 2011. Four additional records showed up in the 2019 review but again were only due to name change so do not impact on the total number of species or impact on the species richness values. Two of the new fauna records include species with a conservation rating - the Peregrine Falcon, *Falco peregrinus*, listed as Rare under the *National Parks and Wildlife Act 1972* (NPW Act), the Osprey, *Pandion haliaetus*, listed as Endangered under the NPW Act. If the analysis were repeated for this cell, the increase in flora species richness and number of threatened bird species, would likely result in this cell achieving a medium conservation rating.

## Cell Descriptions – EP 18 Cape Hardy

### Threat Analysis (GIS)

The total of threat means, 58.636, is very high for the region. Everywhere the combined threat scores are above average and in many places high; in detail the pattern is complex, but the results are high or medium high almost everywhere. The most significant threat layers are ORV tracks (widespread on cliffs, tussock grasslands and dunes); land ownership (in many places the crown coastal reserve is narrow to absent) and land use; viewshed and viewscape; numbers of exotic species with the exception of some tussock grasslands in the south of the cell exotic species are numerous and widespread) and the presence of dangerous weeds (widespread but high in dunes 2 to 3 km south of Cape Burr); feral animals (rabbits recorded as a high threat from Cape Hardy SW for 5 km, also in the NE and SW of the cell). There are also informal carking and camping on private in and adjacent to dunes near Kiandra Road.

It is likely that the area impacted by ORV and informal campsites including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation, dune erosion and disturbance of shorebirds and nesting sites and unmanaged access to an Aboriginal Significant Site. There were also nine additional weed species records, two of which are Declared weeds – Lincoln Weed, *Diplotaxis tenuifolia* and Variegated Thistle, *Silybum marianum*. The threat rating would remain high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility.	Active management of dunes.	
2070: +c.80cm	Dune instability and movement further increased; Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale;	2030: Occasional storm tide flooding above highest known tides; damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	

## Cell Descriptions – EP 18 Cape Hardy

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<i>Intensity</i> of large storms increases			
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain and improve connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Rare flood run-off may deliver sediment down creeks resulting in increased coastal erosion due to creek flooding.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

## Cell Descriptions – EP 18 Cape Hardy

**TABLE 6.67 Recommended Actions and Priority Table for EP18 Cape Hardy**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Dunes and tussock grasslands contain high values for plant associations' state endemicity and rareness - these values are especially threatened by ORV activity, weeds, and (in part) rabbits; In the longer term, dune stability is threatened by climate change.	Devise and implement an access control, weed and feral animal control plan for the scattered remnants of native vegetation in this cell, as the opportunity arises.	High (cons/threat)	EP Landscape Board, landowners
	Connectivity between vegetation remnants is poor.	Improve connectivity as the opportunity arises.	High (cons/threat)	EP Landscape Board, DEW, landowners
	Ongoing and accelerating sea level beginning to cause change in beaches and dunes.	Create a baseline for monitoring shoreline, beach dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Potential for grazing impacts on vegetation including degradation, spread of weeds and on the coastal landforms.	Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained).	Medium (cons/threat)	DEW, EP Landscape Board, landowners
	Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia, DC Tumby Bay, community

## Cell Descriptions – EP 18 Cape Hardy

Component	Issue	Proposed Action	Priority of Action	Key Players
		Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage where appropriate.		
	Informal and formal camping with impact from multiple tracks, soil compaction and soil erosion, vegetation damage and trampling and removal, fauna disturbance, increased fire risk, firewood collection and weed introduction.	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/ infrastructure. Install and/or maintain signage.	Medium (cons/ threat)	EP Landscape Board, DEW, DC Tumby, SA Tourism
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/ threat)	EP Landscape Board, Council, community

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	250.51 ha (25.45 % of the cell)
<b># flora surveys / records</b>	4 (8*) surveys, 6 (8*) opportune sites, 5 (3*) Herbarium records 1 threatened plant population flora record site.
<b># flora in cell</b>	112 (98*)
<b># conservation rated flora in cell</b>	2 (2*)
<b># non-indigenous flora in cell</b>	32 (27*)
<b>Significant CDCS floristic community</b>	<i>Eucalyptus</i> spp. / <i>Melaleuca lanceolata</i> / <i>Melaleuca uncinata</i> mallee – 89% of SA records in EP <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> shrubland – 17% of SA records in EP
<b>Protected area</b>	0.09% of the vegetation is protected

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

## Cell Descriptions – EP 18 Cape Hardy

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Agave americana</i>	Century Plant		1
<i>Aizoon pubescens</i>	Coastal Galenia		-
<i>Arctotheca calendula</i>	Cape Weed		1
<i>Argyranthemum frutescens</i> ssp.	Marguerite Daisy		4
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	Bridal Creeper	D, RA	9
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avellinia michelii</i>	Avellinia		0
<i>Avena barbata</i>	Bearded Oat		2
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus rubens</i>	Red Brome		2
<i>Cakile maritima</i> ssp. <i>maritima</i>	Two-horned Sea Rocket		1
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3
<i>Euphorbia paralias</i>	Sea Spurge	RA	5
<i>Gazania rigens</i>	Gazania	D, RA	6
<i>Hordeum glaucum</i>	Blue Barley-grass		1
<i>Hornungia procumbens</i>	Oval Purse		0
<i>Lamarckia aurea</i>	Toothbrush Grass		-
<i>Limonium sinuatum</i>	Notch-leaf Sea-lavender		3
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Malva parviflora</i>	Small-flower Marshmallow		-
<i>Marrubium vulgare</i>	Horehound	D, RA	5
<i>Medicago minima</i>	Little Medic		1
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Medicago truncatula</i>	Barrel Medic		1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Rumex hypogaeus</i>	Three-corner Jack		-
<i>Silene nocturna</i>	Mediterranean Catchfly		1
<i>Silybum marianum</i>	Variegated Thistle	D	-
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

Cell Descriptions – EP 18 Cape Hardy

Native flora

Species	Common Name	Aus status	SA status
<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R
<i>Acacia sclerophylla</i> var. <i>sclerophylla</i>	Hard-leaf Wattle		
<i>Apium annuum</i>	Annual Celery		
<i>Atriplex cinerea</i>	Coast Saltbush		
<i>Atriplex muelleri</i>	Mueller's Saltbush		
<i>Atriplex semibaccata</i>	Berry Saltbush		
<i>Austrostipa drummondii</i>	Cottony Spear-grass		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Austrostipa exilis</i>	Heath Spear-grass		
<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass		
<i>Brachyscome ciliaris</i> var. <i>ciliaris</i>	Variable Daisy		
<i>Brachyscome lineariloba</i>	Hard-head Daisy		
<i>Bulbine semibarbata</i>	Small Leek-lily		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Comesperma volubile</i>	Love Creeper		
<i>Crassula colligata</i> ssp. <i>lamprosperma</i>			
<i>Crassula colorata</i> var. <i>colorata</i>	Dense Crassula		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Dianella revoluta</i> var.			
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Einadia nutans</i> ssp.	Climbing Saltbush		
<i>Einadia nutans</i> ssp. <i>nutans</i>	Climbing Saltbush		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eremophila crassifolia</i>	Thick-leaf Emubush		
<i>Eucalyptus dumosa</i>	White Mallee		
<i>Eucalyptus dumosa</i> complex	White Mallee		
<i>Eucalyptus gracilis</i>	Yorrell		
<i>Eucalyptus peninsularis</i> -- <i>Eucalyptus socialis</i> ssp.	Cummins Mallee		
<i>Eucalyptus socialis</i> (NC)	Beaked Red Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Gabnia densa</i>	Limestone Saw-sedge		
<i>Glycine rubiginosa</i>	Twining Glycine		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Helichrysum leucopsidium</i>	Satin Everlasting		
<i>Heliotropium aspernum</i>	Rough Heliotrope		
<i>Kennedia prostrata</i>	Scarlet Runner		
<i>Lasiopetalum behrii</i>	Pink Velvet-bush		
<i>Lepidium foliosum</i>	Leafy Peppergrass		
<i>Leucophyta brownii</i>	Coast Cushion Bush		
<i>Lomandra effusa</i>	Scented Mat-rush		
<i>Maireana brevifolia</i>	Short-leaf Bluebush		
<i>Maireana</i> sp.	Bluebush/Fissure-plant		
<i>Malva preissiana</i> (NC)	Australian Hollyhock		
<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	Mallee Honey-myrtle		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca uncinata</i>	Broombush		
<i>Nicotiana maritima</i>	Coast Tobacco		

## Cell Descriptions – EP 18 Cape Hardy

Species	Common Name	Aus status	SA status
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia floribunda</i>	Heath Daisy-bush		
<i>Oxalis perennans</i>	Native Sorrel		
<i>Oxalis perennans</i> (NC)	Native Sorrel		
<i>Phebalium bullatum</i>	Silvery Phebalium		
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme Riceflower		
<i>Podolepis tepperi</i>	Delicate Copper-wire Daisy		
<i>Pogonolepis muelleriana</i>	Stiff Cup-flower		
<i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i>	Mallee Pomaderris		
<i>Prostanthera serpyllifolia</i> ssp. <i>microphylla</i>	Small-leaf Mintbush		
<i>Ptilotus</i> sp.	Mulla Mulla		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Rhodanthe pygmaea</i>	Pigmy Daisy		
<i>Roepera</i> sp.	Twinleaf		
<i>Salsola australis</i>	Buckbush		
<i>Santalum acuminatum</i>	Quandong		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Senecio spanomerus</i>			
<i>Setaria constricta</i>	Knotty-butt Paspalidium		
<i>Spyridium eriocephalum</i> var. <i>eriocephalum</i>	Heath Spyridium		
<i>Tecticornia</i> sp.	Samphire		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Thryptomene micrantha</i>	Ribbed Thryptomene		
<i>Triodia irritans</i>	Spinifex		
<i>Triodia scariosa</i>	Spinifex		
<i>Westringia dampieri</i>	Shore Westringia		
<i>Wilsonia rotundifolia</i>	Round-leaf Wilsonia		
<i>Wurmbea dioica</i> ssp. <i>brevifolia</i>	Early Nancy		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	119 (98*) recorded – 97 (87*) birds, 14 (6*) reptiles, 0 (0*) butterflies, 6 (5*) mammals, 1 (0*) amphibian (an additional 15* reptiles and 25* butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	3 (4*) survey sites, 28 (9*) opportune sites, 0 (1*) reserve database fauna record
<b># of threatened fauna in cell</b>	14 (9*)
<b># of non-indigenous fauna</b>	10 (9*)

(#\*) Number of records present and analysed in 2011 study. Where the # of records differ in tables below, it means records have been deleted since the 2011 analysis.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.



## Cell Descriptions – EP 18 Cape Hardy

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Alauda arvensis</i>	Eurasian Skylark	Aves	
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Spilopelia chinensis</i>	Spotted Dove	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Felis catus</i>	Domestic Cat (Feral Cat)	Mammalia	
<i>Mus musculus</i>	House Mouse	Mammalia	
<i>Oryctolagus cuniculus</i>	Rabbit (European Rabbit)	Mammalia	
<i>Vulpes vulpes</i>	Fox (Red Fox)	Mammalia	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Blue = recorded in 2019, new since 2011

### Birds

Species	Common Name	Aus status	SA status
<i>Accipiter cirrocephalus cirrocephalus</i>	Collared Sparrowhawk		
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)		
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Ardea pacifica</i>	White-necked Heron		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo		
<i>Cacomantis pallidus</i>	Pallid Cuckoo		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Chalcites basalus</i>	Horsfield's Bronze Cuckoo		
<i>Chalcites lucidus</i>	Shining Bronze Cuckoo		
<i>Chalcites osculans</i>	Black-eared Cuckoo		
<i>Charadrius bicinctus</i>	Double-banded Plover		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Circus assimilis</i>	Spotted Harrier		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus bennetti</i>	Little Crow		
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Coturnix pectoralis</i>	Stubble Quail		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		

Cell Descriptions – EP 18 Cape Hardy

Species	Common Name	Aus status	SA status
<i>Epthianura albigrons</i>	White-fronted Chat		
<i>Epthianura tricolor</i>	Crimson Chat		
<i>Endiptyula minor</i>	Little Penguin		
<i>Falco berigora</i>	Brown Falcon		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Gymnorhina sp.</i>			
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		E
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Lalage tricolor</i>	White-winged Triller		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus cyaneus leggei</i>	Superb Fairywren (Mainland SA)		
<i>Malurus leucopterus</i>	White-winged Fairywren		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Megalurus gramineus</i>	Little Grassbird		
<i>Megalurus mathewsi</i>	Rufous Songlark		
<i>Melopsittacus undulatus</i>	Budgerigar		
<i>Merops ornatus</i>	Rainbow Bee-eater		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Milvus migrans</i>	Black Kite		
<i>Mirafra javanica</i>	Horsfield's Bush Lark		
<i>Morus serrator</i>	Australasian Gannet		
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Nycticorax caledonicus</i>	Nankeen Night Heron		
<i>Nymphicus hollandicus</i>	Cockatiel		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pandion haliaetus</i>	Osprey		E
<i>Pardalotus punctatus</i>	Spotted Pardalote		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Parvipsitta porphyrocephala</i>	Purple-crowned Lorikeet		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phaps chalcoptera</i>	Common Bronzewing		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		
<i>Platalea regia</i>	Royal Spoonbill		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sternula nereis</i>	Fairy Tern	V	E
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V

## Cell Descriptions – EP 18 Cape Hardy

Species	Common Name	Aus status	SA status
<i>Todiramphus sanctus</i>	Sacred Kingfisher		
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinesibes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesibes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

Species	Common Name	Aus status	SA status
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		
<i>Macropus (Osphranter) robustus</i>	Euro		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

## Cell Descriptions – EP 18 Cape Hardy

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Ctenophorus fordi</i>	Mallee Dragon			
<i>Hemiergis peronii</i>	Four-toed Earless Skink			
<i>Heteronotia binoei</i>	Bynoe's Gecko			
<i>Lerista dorsalis</i>	Southern Four-toed Slider			
<i>Menetia greyii</i>	Dwarf Skink			
<i>Morethia adalaidensis</i>	Adelaide Snake-eye			
<i>Morethia boulengeri</i>	Common Snake-eye			
<i>Notechis scutatus</i>	Tiger Snake	ssp		
<i>Pseudonaja inframacula</i>	Peninsula Brown Snake			
<i>Pseudonaja mengdeni</i>	Gwardar			
<i>Tiliqua occipitalis</i>	Western Bluetongue			
<i>Tiliqua rugosa</i>	Sleepy Lizard			
<i>Tympanocryptis lineata</i>	Lined Earless Dragon			
<i>Varanus gouldii</i>	Sand Goanna			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

Blue = recorded in 2019, new since 2011

### Amphibians

Species	Common Name	Aus status	SA status
<i>Neobatrachus</i> sp.			

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

## Cell EP 19 Oswald Trig

Cell area 604.93 ha. Shoreline length 11.1 km.



### Landforms

From Salt Creek Beach to Lipson Island the coastline runs SW-NE, with no major indentations or change. This section divides into two halves: a southern shoreline of a low energy, coarse sand, reflective beach, backed by low unstable Holocene dunes, and small low lying poorly drained saline areas; the beaches are of mixed bioclastic and quartz sand. The northern half has an undulating plain of granitic basement rocks, with short first order valleys running to low (5<50m) basement cliffs, inlets and sloping, rubble-covered, platforms. The northern section has a number of very small pocket beaches with dunes; also low, patchy, Holocene cliff top dunes near Lipson Island at the NE perimeter of the cell.

### Benthic Habitat

EnvMaps shows no national or state benthic survey apart from a small section covering the southern portion of the cell which is mapped as dense

seagrass inshore with sparse seagrass in deeper waters.

### Biota

Remnant vegetation covers an area of 25% of the cell. There is one flora survey site, one herbarium record site and 15 opportune fauna survey sites within this cell. Two vegetation associations are mapped in this cell: on the dunes emergent +/- *Acacia sp. Winged* (C.R. Alcock 4936) over *Lasiopetalum discolor*, *Pimelea serpyllifolia ssp. serpyllifolia*, *Pultenaea tenuifolia*, *Veronica hillebrandii*, +/- *Gabnia deusta* low open shrubland. Between 2.3 and 4.4km from Lipson Island floristic mapping shows samphire low shrubland; however this is not mapped on other layers and appears unlikely, because of the topography. Other vegetation blocks are not recorded (this problem appears to need further mapping to resolve).

### Land Use/Land Ownership

Traditional lands of the Barngarla people.

There is a substantial coastal reserve of unalienated Crown land along the length of the cell, interspersed with several large, wider sections dedicated to the care and control of the District Council of Tumby Bay.





**FIGURE 6.72** Southern half of cell EP19. Photo: Coast Protection Board, 2018

Uses (Field visits and local reports)

Conservation – Local Council Coastal Reserves.

Agriculture – Cropping, grazing.

Recreation & Tourism – Sightseeing, nature, hiking, swimming, recreational fishing, cockling, camping (informal at Berg’s Beach), horse riding, dog walking, ORV use (four-wheel drive, motorbike), boating.

Boat Launching – Beach.

Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Hooded Plover, Rock Parrots, Sooty and Pied Oyster catcher).

Threats (Field visits and local reports)

Agriculture – Grazing.

Proximity to Aquaculture – Marine debris.

Uncontrolled Access – ORV use, informal camping, firewood collection leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Feral Animals – Cats, rabbits, foxes.

Weed Infestation – African Boxthorn, succulents.

Opportunities (Field visits and local reports)

Opportunity for coastal management plans to be developed and implemented in collaboration with DEW, EP Landscape Board, coastal landholders and local government, with particular emphasis on pest plant and animal control.

## Cell Descriptions – EP 19 Oswald Trig

Monitoring - continue Hooded Plover biennial count; increase monitoring of Hooded Plover during the nesting season to determine value of Bergs Beach as nesting territory.

### Conservation Analysis (GIS)

The total of conservation means, 74.4, is low for the region. Much of the cell has been cleared and shows low and low-medium totals. Dunes in the southern half of the cell and just south of Lipson Island record medium values, and near the southern boundary of the cell, medium high totals. Rarity of CDCS plant associations, viewshed and viewscape and vegetation block metrics are the main contributors to the total. Many minor values are recorded; notable are the numbers of threatened mammals, habitat for butterfly species. The Wallaby Sam monument on the Lipson Cove foreshore is listed on the State Heritage register. Approximately one fifth of the cell is sand dune and these areas have a concentration of the conservation values.

The 2019 review showed an increase with three additional native flora species recorded since the 2011 analysis, though no additional weed species records, with a total number of 36 flora species records by the 2019 review. An additional unique native flora species record was due to a taxonomic name change for Pimpernel, *Angallis arvensis*, which has changed to *Lysimachia arvensis* so has not increased the total number of records. Three flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of eight additional native fauna species recorded since the 2011 analysis and one additional non-indigenous species with a total number of eight fauna species records by 2019. Three fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable) which account for no increase in the total number of fauna species. Three of the new fauna records include species with a conservation rating - the Sooty Oystercatcher, *Haematopus fuliginosus* and the (Australian) Pied Oystercatcher, *Haematopus longirostris*, both listed as Rare under the *National Parks and Wildlife Act 1972* (NPW Act), and the Hooded Plover, *Thinornis cucullatus*, listed as Vulnerable under NPW Act and the *Environment Protection and Biodiversity Conservation Act 1999*. If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased, it is unlikely that this would be enough to raise the conservation rating of the cell to medium.

### Threat Analysis (GIS)

The threat total for cell EP 19 is high, at 54.405. High and medium high totals extend throughout the cell, dune areas have high and medium high totals. ORV impact scores are high for the Crown coastal land, notably dune areas in the south of the cell; land ownership and land use, viewshed and viewscape, vegetation block degradation, dangerous weeds (all dune areas, high in the north where African Boxthorn is recorded) and feral animals (rabbits are recorded as a high threat for much of the cell) all show average or higher values.

It is likely that the area impacted by ORV and informal campsites including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation, dune erosion and disturbance of shorebirds and nesting sites. While there were no new weed species records identified in the 2019 data review, African Boxthorn and succulent garden escapees are recorded as an ongoing issue. The threat rating remains high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

## Cell Descriptions – EP 19 Oswald Trig

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility.	Active management of dunes.	
2070: +c.80cm	Dune instability and movement further increased; Low elevations and low sand volumes in the southern part of cell lead to overtopping, rapid recession and sand loss.	Manage to reduce instability.	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; damage to foredunes; more frequent and extended flooding of saline coastal lowlands.	Continue to monitor shoreline movement; Active management of dunes.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Rare flood run-off may deliver sediment down creeks resulting in increased coastal erosion due to creek flooding.		
<b>Groundwater lowering; saline incursion</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables	Adaptive management of plant assets.	Monitor level and salinity of water



## Cell Descriptions – EP 19 Oswald Trig

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	in dunes. Local impact on soil water and vegetation survival.		table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**Table 6.68 Recommended Actions and Priority for EP19 Oswald Trig**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level rise beginning to cause erosion and recession in dune.	Create a baseline for monitoring shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (Cons/threat)	DEW, EP Landscape Board
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, DC Tumby, community
	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board
	Potential for grazing impacts on vegetation including degradation, spread of weeds and on the coastal landforms.	Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained).	Medium (cons/threat)	DEW, EP Landscape Board, landowners

## Cell Descriptions – EP 19 Oswald Trig

Component	Issue	Proposed Action	Priority of Action	Key Players
	ORV activity and weeds threaten conservation values of all dunes; boxthorn is recorded in dunes in the north of the cell.	Strategic dune management to manage ORV access and weed invasion.	High (cons/threat)	EP Landscape Board, DEW, DC Tumby
	Informal and formal camping with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors.	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/ infrastructure. Install and/or maintain signage.	Medium (cons/threat)	EP Landscape Board, DEW, DC Tumby Bay, SA Tourism
	Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage where appropriate.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia, DC Tumby Bay, community
Dunes	Dunes eroded by storms and destabilised by sea level rise and increasing aridity and weed	Manage dune degradation where appropriate; Monitor dune movement and review impact on neighbouring lands.	Medium (cons/threat)	EP Landscape Board, DEW

## Cell Descriptions – EP 19 Oswald Trig

Component	Issue	Proposed Action	Priority of Action	Key Players
	invasion threaten dune stability.	Improve connectivity to foster resilience of vegetation communities.		DC Tumby Bay

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	250.51 ha (25.45% of the cell)
<b># flora surveys / records</b>	1 (1*) surveys, 0 (0*) opportune sites, 1 (1*) Herbarium record
<b># flora in cell</b>	36 (39*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	12 (15*)
<b>Significant CDCS floristic community</b>	<i>Beyeria lechenaultii</i> / <i>Acrotriche patula</i> shrubland – 27% of SA records in EP
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Avena barbata</i>	Bearded Oat		2
<i>Erodium botrys</i>	Long Heron's-bill		0
<i>Hornungia procumbens</i>	Oval Purse		0
<i>Hypochaeris glabra</i>	Smooth Cat's Ear		2
<i>Lysimachia arvensis</i>	Pimpernel		(2)
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Medicago truncatula</i>	Barrel Medic		1
<i>Moraea setifolia</i>	Thread Iris		0
<i>Plantago coronopus</i> ssp. <i>coronopus</i>	Bucks-horn Plantain		2
<i>Senecio pterophorus</i>	African Daisy		2
<i>Sonchus oleraceus</i>	Common Sow-thistle		0
<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover		2

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

#### Native flora

Species	Common Name	Aus status	SA status
<i>Austrostipa exilis</i>	Heath Spear-grass		
<i>Austrostipa hemipogon</i>	Half-beard Spear-grass		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern		
<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera		

## Cell Descriptions – EP 19 Oswald Trig

Species	Common Name	Aus status	SA status
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Euphorbia multiflora</i>			
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Glycine rubiginosa</i>	Twining Glycine		
<i>Gonocarpus mezianus</i>	Broad-leaf Raspwort		
<i>Helichrysum leucopsidum</i>	Satin Everlasting		
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge		
<i>Lomandra effusa</i>	Scented Mat-rush		
<i>Opercularia scabrida</i>	Stalked Stinkweed		
<i>Oxalis perennans</i> (NC)	Native Sorrel		
<i>Ptilotus spathulatus</i>	Pussy-tails		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Scleranthus pungens</i>	Prickly Knawel		
<i>Stackhousia monogyna</i>	Creamy Candles		
<i>Stackhousia monogyna</i> (NC)	Creamy Candles		
<i>Triodia scariosa</i>	Spinifex		
<i>Vittadinia cuneata</i> var. <i>cuneata</i>	Fuzzy New Holland Daisy		
<i>Wahlenbergia stricta</i> ssp. <i>stricta</i>	Tall Bluebell		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	8 (3*) recorded – 8 (3*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional (18*) reptiles and (25*) butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 15 (0*) opportune sites
<b># of threatened fauna in cell</b>	3 (1*)
<b># of non-indigenous fauna</b>	0 (0*)

(#\*) Number of records present and analysed in 2011 study.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

No non-indigenous species were recorded in 2019.

Species	Common Name	Class	Record
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		

## Cell Descriptions – EP 19 Oswald Trig

Species	Common Name	Aus status	SA status
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Larus pacificus</i>	Pacific Gull		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinesibes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesibes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammal species were recorded in 2011 or 2019 data.

### Reptiles

No reptile species recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthopbis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e

## Cell Descriptions – EP 19 Oswald Trig

Species	Common Name	Aus status	SA status	Record
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Christinus marmoratus</i>	Marbled Gecko			e
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenophorus pictus</i>	Painted Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Hemiergis peronii</i>	Four-toed Earless Skink			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Pogona vitticeps</i>	Central Bearded Dragon			c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e
<i>Tympanocryptis lineata</i>	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2011 or 2019 data.

**Cell EP 22 Red Cliffs**

Cell area 523 ha Shoreline length 11.6 km.



Landforms

This cell is low, nearly flat, coastal plain of Pleistocene alluvial sediment; it is the eastern coast of a narrowing peninsula running to Point Bolingbroke, (EP 23). The shoreline shows a distinctive pattern of small curved sandy embayments between basement rock controlled headlands. The shore has narrow dunes with occasional very low cliffs, beaches are narrow, low energy, with coarse sands. The small headlands show low basement rock reefs with irregular rocky surfaces; this granitic material may be the source for the coarse sands of the shore; one headland – Red Cliffs – shows low red Pleistocene cliffs over an extensive shore platform. The narrow line of white sand Holocene dunes is virtually continuous, both connected to the beaches and across the rocky ramps of the headlands. Landward of the narrow dune barriers, in the embayments, there are small post-barrier lowlands that are seasonally

flooded.

Benthic Habitat

Dense seagrass offshore, narrow inshore sand and granitic reefs.

Biota

Remnant vegetation covers an area of 16% of the cell. There are four herbarium record sites and 23 opportune fauna survey sites within this cell.

The dunes from Red Cliff south are *Eucalyptus angulosa* mid mallee woodland over *Melaleuca lanceolata*, *Melaleuca uncinata*, *Lasiopetalum discolor* tall shrubs; from Red Cliff north *Melaleuca lanceolata*, +/- *Olearia axillaris*, +/- *Leucopogon parviflorus* tall open shrubland over +/- *Rhagodia candolleana ssp. candolleana*, +/- *Threlkeldia diffusa* low shrubs are found. Post barrier lowlands have emergent *Nitraria billardierei* over *Maireana oppositifolia*, *Atriplex paludosa ssp. cordata*, *Lycium australe* mid open shrubland over *Frankenia pauciflora var.*, *Frankenia sessilis*, *Tecticornia halocnemoides ssp.*, *Lanrenzia squamata* low shrubs.



Land Use/Land Ownership

Traditional lands of the Barngarla people.

There is a narrow coastal reserve of unalienated Crown land making up 7% of the cell; almost all other areas are cleared. Isolated dwellings are found at each small headland.



**FIGURE 6.73 Red Cliffs. Basement rock shore platforms, Pleistocene sediment cliffs; white Holocene sands beaches and dune barrier, with post barrier saline lowland. Photo: Coast Protection Board, 2018**

Uses (Field visits and local reports)

Much of this cell is cultivated.

Conservation – Sir Joseph Banks Marine Park – Habitat Protection Zone; Private Property – Bolingbroke.

Agriculture – Cropping, grazing.

Commercial fishing – Marine scale fish – net, hook and line; charter fishing.

Recreation & Tourism – Sightseeing, hiking, ecotourism – Bolingbroke Beach House, swimming, body surfing, snorkelling, recreational fishing, crabbing, camping (formal Church camps at Red Cliffs, Trinity and Thuruna, and informal at roadside stops), dog walking, ORV use (four-wheel drive, motorbike), boating.

Boat launching – Beach, boat ramp.

Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Hooded Plover, Rock Parrot).

seagrass, sandy bottom, rocky reef, island habitat, Rhodoliths - colourful, unattached, branching, crustose benthic marine red algae that resemble coral. Rhodolith beds create biogenic habitat for diverse benthic communities.



## Cell Descriptions – EP 22 Red Cliffs

### Threats (Field visits and local reports)

Agriculture – Grazing.

Pollution – Rubbish dumping, toileting, marine debris.

Uncontrolled access – ORV use, informal camping, firewood collection leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Feral animals – Rabbits, foxes, cats.

Weed infestation – Garden escapees e.g. Marguerite daisy, proximity to agriculture e.g. African Boxthorn, weedy grasses.

Climate Change – Storm surge causing erosion of coastline.

### Opportunities (Field visits and local reports)

Opportunity for Coastal management plans to be developed and implemented in collaboration with coastal landholders, EP Landscape Board and local government, with particular emphasis revegetation at Thuruna to address erosion, pest plant and animal control in collaboration with landholders, and access control, particularly at Hooded Plover breeding sites.

Conservation – improve Hooded Plover territory management with District Council of Tumby Bay and private landholders in liaison with Birds Australia.

Monitoring – continue Hooded Plover biennial count, territory monitoring.

Education – target visitors through Church campgrounds and Bolingbroke beach house users.

On-ground projects – Thuruna historical erosion control management – continued litter removal, stabilisation, revegetation; continue marine debris clean up at Thuruna erosion site.

### Conservation Analysis (GIS)

The total of conservation means is 55.92, low for the region. Almost the entire cell is low to medium low in total; small areas of dune only give a combined total that is medium to medium high. Habitat for threatened fauna, for threatened reptiles (dunes) and threatened mammals, together with viewscape draw attention to the main values; also there are minor totals for threatened flora, numbers of threatened species and species richness; the cell is within the range of sighted Eastern Osprey, and the dunes are habitat for the Beach Slider and Bight Coast Skink, focal species. The narrow strip of remnant vegetation forms a vestigial N–S corridor for coastal species.

The 2019 review showed no new native flora species records and no additional weed species records since the 2011 analysis with only three flora species records by the 2019 review. Two flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of 19 additional native fauna species recorded since the 2011 analysis though no additional non-indigenous species, bringing the total number of 32 fauna species records by 2019. Five of the new fauna records include species with a conservation rating - the Cape Barren Goose, *Cereopsis novaehollandiae novaehollandiae*, listed as Rare under the *National Parks and Wildlife Act 1972*, the (NPW Act) the Sooty Oystercatcher, *Haematopus fuliginosus* and the (Australian) Pied Oystercatcher, *Haematopus longirostris*, both listed as Rare under the NPW Act, the Hooded Plover, *Thinornis cucullatus* and the Australian Sea Lion, *Neophoca cinerea* both listed as Vulnerable under NPW Act and *Environment Protection and Biodiversity Conservation Act 1999*. If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased, it is unlikely that this would be enough to raise the conservation rating of the cell to medium.

## Cell Descriptions – EP 22 Red Cliffs

### Threat Analysis (GIS)

Threat totals are high for the cell, 63.195. ORV activity, development zoning, land ownership (very high), viewshed and viewscape, existing development, land use, vegetation block degradation, weeds and feral animals (northern half of cell) contribute to the high threat total. Masseena Bay and to the north is entirely a high total; to the south totals are medium high.

It is likely that the area impacted by ORV and informal campsites including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation, dune erosion and disturbance of shorebirds and nesting sites. While there were no new weed species records identified in the 2019 data review, there are known occurrences of African Boxthorn and the proximity to agriculture brings with it, weedy grasses, and garden escapees are associated with developed area eg Marguerite daisy. The threat rating remains high.

### Possible Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes to slow recession.	
2070: +c.80cm	Dune instability and movement further increased. Bay shorelines recede.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	Occasional storm tide flooding above highest known tides; damage to foredunes; low dunes locally overtopped; Severe erosion of Pleistocene sediments at Red Cliff.	Continue to monitor shoreline movement and dune movement; Active management of dunes.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Connectivity of vegetation within the coastal boundary is tenuous and should be improved where possible.

Cell Descriptions – EP 22 Red Cliffs

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>Groundwater lowering; saline incursion</b>	Aridity locally lowers fresh groundwater pressure. Local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

Table 6.69 Recommended Actions and Priority for EP22 Red Cliffs

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Fragile narrow coastal vegetation a valuable N-S corridor for coastal species.	Resist further incursions and clearance; enhance corridor as the opportunity arises.	Medium (cons/threat)	EP Landscape Board, DC Tumby Bay
	Climate change and ongoing and accelerating sea level rise beginning to cause change in dunes.	Create a baseline for monitoring shoreline, dune and cliffs by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, DC Tumby Bay, community

## Cell Descriptions – EP 22 Red Cliffs

Inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board
Potential for grazing impacts on vegetation including degradation, spread of weeds and on the coastal landforms.	Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained).	Medium (cons/ threat)	DEW, EP Landscape Board, landowners
ORV activity and weeds threaten conservation values of all dunes; boxthorn is recorded in dunes in the north of the cell.	Strategic dune management to manage ORV access and weed invasion.	Medium (cons/threat)	EP Landscape Board, DEW, DC Tumby Bay
Informal and formal camping with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors.	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/ infrastructure. Install and/or maintain signage.	Medium (cons/threat)	EP Landscape Board, DEW, DC Tumby Bay, SA Tourism
Areas within cell identified as being important habitat for threatened shorebirds, and potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season, restrict access to sensitive locations, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage where appropriate.	High (cons/ threat)	DEW, EP Landscape Board, Birds Australia, DC Tumby Bay, community

## Cell Descriptions – EP 22 Red Cliffs

Dunes	Dunes contain small areas of valuable vegetation, but are threatened by ORV and weed incursion.	Develop a local plan to progressively control access and threats.	Medium (cons/threat)	EP Landscape Board, DEW, DC Tumby Bay
	Dunes eroded by storms and destabilised by sea level rise and increasing aridity and weed invasion threaten dune stability.	Manage dune degradation where appropriate; Monitor dune movement and review impact on neighbouring lands. Improve connectivity to foster resilience of vegetation communities.	Medium (cons/threat)	EP Landscape Board, DEW, DC Tumby Bay
Developed areas.	Garden escapees from beach houses.	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants.	Medium (cons/threat)	EP Landscape Board, DC Tumby community, landowners

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	84.12 (16.08% of the cell)
<b># flora surveys / records</b>	0 (0*) surveys, 0 (0*) opportune sites, 4 (2*) Herbarium records
<b># flora in cell</b>	3 (5*)
<b># conservation rated flora in cell</b>	1 (1*)
<b># non-indigenous flora in cell</b>	0 (2*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	None of the vegetation in the cell is protected.

(#\*) Number of records present and analysed in 2011 study.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

No weeds recorded in 2019 data.

#### Native flora

No new native flora species recorded in 2019 data.

Species	Common Name	Aus status	SA status
<i>Acacia lignulata</i>	Umbrella Bush		

## Cell Descriptions – EP 22 Red Cliffs

Species	Common Name	Aus status	SA status
<i>Eucalyptus calcareana</i>	Nundroo Mallee		
<i>Spyridium leucopogon</i>	Silvery Spyridium		R

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

# of fauna in cell	32 (15*) recorded – 31 (15*) birds, 0 (0*) reptile, 0 (0*) butterflies, 1 (0*) mammals, 0 (0*) amphibian (an additional 18* reptiles and 25* butterflies identified by experts as possibly occurring)
# of fauna surveys / records	0 (0*) survey sites, 23 (3*) opportune sites
# of threatened fauna in cell	7 (2*)
# of non-indigenous fauna	3 (3*)

(#\*) Number of records present and analysed in 2011 study.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Alauda arvensis</i>	Eurasian Skylark	Aves	
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Blue = recorded in 2019, new since 2011

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Ardenna tenuirostris</i>	Short-tailed Shearwater		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Chalcites lucidus</i>	Shining Bronze Cuckoo		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		

## Cell Descriptions – EP 22 Red Cliffs

Species	Common Name	Aus status	SA status
<i>Larus pacificus</i>	Pacific Gull		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Morus serrator</i>	Australasian Gannet		
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otares</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

Species	Common Name	Aus status	SA status
<i>Neophoca cinerea</i>	Australian Sea Lion	V	V

## Cell Descriptions – EP 22 Red Cliffs

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Reptiles

No reptile species recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Acanthophis antarcticus</i>	Common Death Adder			e
<i>Amphibolurus norrisi</i>	Mallee Tree-dragon			e
<i>Aprasia inaurita</i>	Red-tailed Worm-lizard			c
<i>Bassiana trilineata</i>	Western Three-lined Skink		<b>R</b>	e
<i>Christinus marmoratus</i>	Marbled Gecko			e
<i>Cryptoblepharus pulcher</i>	Striped Wall Skink			e
<i>Ctenophorus fionni</i>	Peninsula Dragon			c
<i>Ctenotus orientalis</i>	Spotted Ctenotus			e
<i>Delma australis</i>	Barred Snake-lizard			e
<i>Hemiergis peronii</i>	Four-toed Earless Skink			c
<i>Lerista dorsalis</i>	Southern Four-toed Slider			e
<i>Menetia greyii</i>	Dwarf Skink			e
<i>Morethia obscura</i>	Mallee Snake-eye			e
<i>Notechis scutatus</i>	Eastern Tiger Snake	<b>ssp</b>		c
<i>Pygopus lepidopodus</i>	Common Scaly-foot			e
<i>Tiliqua occipitalis</i>	Western Bluetongue			c
<i>Tiliqua rugosa</i>	Sleepy Lizard			e
<i>Tympanocryptis lineata</i>	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2011 or 2019 data.



## Cell EP 25 Louth Bay/Louth Island

Cell area 613.9 ha. Shoreline length 10.5 km.



### Landforms

This is a low energy, zeta-curved bay, between the basement rock headlands of Point Wara and Point Boston. The beach is a reflective coarse sand beach, fronted by sand flats with nearshore seagrass, and backed by low calcareous shelly beach ridges. These ridges appear to have prograded in Holocene times, in conditions of plentiful sediment supply from offshore and from the land; the beach ridge plain is wider at the north of the bay. The coastal plain is low lying and with extensive saline floodable areas behind the barrier ridges. The Tod River appears to deliver quantities of sediment to the shore, where the coarse fraction is transported in the nearshore zone mainly to the north.

### Benthic Habitat

Inshore bare sand, then dense seagrass. The bay is a Wetland of National Importance (ID 2718),

described as in ‘moderate’ condition.

### Biota

Remnant vegetation covers an area of 48% of the cell. There are eight herbarium record sites and 53 opportunistic fauna survey sites within the cell. Beach ridges are mapped as *Melaleuca balmaturorum* tall shrubland over *Gabnia filum* sedges. Parts of post barrier floodable lowland is shown as *Tecticornia pergranulata* ssp. *pergranulata*, *Parapholis incurva*, +/- *Medicago truncatula* low open shrubland. South of the Tod a small area of beach ridges is recorded as *Eucalyptus diversifolia* ssp. *diversifolia*, +/- *Eucalyptus albopurpurea*, +/- *Eucalyptus rugosa*, +/- *Eucalyptus angulosa*, +/- *Allocasuarina verticillata* mid open mallee forest over *Melaleuca lanceolata*, *Leucopogon parviflorus* tall shrubs.

### Land Use/Land Ownership

Traditional lands of the Barnjarla people. Area on the north side of the Tod River owned and managed by Aboriginal Lands Trust (Port Lincoln Aboriginal Community Corporation). The majority of the northern c.2 km of the cell, including and immediately south of the township of Louth Bay, is either unalienated Crown land or Crown land dedicated to the care and control

## Cell Descriptions – EP 25 Louth Bay

of the District Council of the Lower Eyre Peninsula. South of the township of Louth Bay, for c.2 km, within the coastal boundary is Crown land Act reserve and unalienated Crown land. A section of the coastline along Louth Beach is privately owned up to the high water mark.



**FIGURE 6.74 Louth Bay. Photo: Coast Protection Board, 2018**

### *Uses (Field visits and local reports)*

Township – Louth Bay.

Conservation – council coastal reserves close to Louth Bay township, unalienated Crown land either side of Tod River.

Agriculture – Grazing, cropping (some).

Aquaculture – Mussel Farm offshore (some disused infrastructure in the bay); Abalone farm onshore near Louth Bay.

Recreation & Tourism – Sightseeing, nature, hiking, swimming, recreational fishing, informal camping (Tod river mouth beach), horse-riding, dog walking, ORV use (four wheel drives, motorbikes), boating.

Boat launching – Beach (Tod River mouth, Louth Bay south); boat ramp (Louth Bay).

### *Values (Field visits and local reports)*

Conservation – important habitat for threatened fauna (migratory shorebirds and waders at Tod River mouth, fairy terns).

The Tod River Wetland System covers a large section from the mid-southern part of the cell and is a Wetland of National Importance.

## Cell Descriptions – EP 25 Louth Bay

### Threats (Field visits and local reports)

There is a mining tenement over much of the Crown land near Louth Bay, and currently two large working sand and gravel quarries.

Agriculture – Grazing.

Proximity to aquaculture – Occasional marine debris.

Pollution – Rubbish dumping at river mouth; marine debris.

Stormwater – Marine pollution.

Uncontrolled access – ORV use, informal camping, off-leash dog walking leading to destruction of samphire, disturbance of shorebirds and risks to beach users.

Feral animals – Foxes, cats, rabbits.

Weed infestation – African Boxthorn.

Future development – Residential; Tourism.

### Opportunities (Field visits and local reports)

Activities/Collaborations – Council, Residents' Association, Local school (Poonindie Primary).

Opportunity to develop and implement coastal management plans in collaboration with landholders, EP Landscape Board and community with particular focus on access management, revegetation and pest plant and animal control.

On-ground projects – Access management; revegetation at mouth to protect samphire habitat areas.

Monitoring – Continue monitoring birds at creek mouth; potential to monitor land-based impacts on seagrass habitat at the creek mouth.

Education – opportunity to develop programs with Poonindie Primary School.

### Conservation Analysis (GIS)

The sum of conservation means is 82.39, low for the region. Combined detailed layers shows beach ridges south of 'Reservoir' to have medium high totals, floodable areas medium low, and all other areas low. Above average layers include threatened status of fauna (wetlands near the Tod River), number of threatened bird (Tod River floodplain), reptile (dunes) and mammal (central dune areas) species, White-bellied Sea Eagle habitat (entire cell within range), viewshed and viewscape. Smaller values accumulate from a number of layers, including: number of threatened species (very high along the Tod River floodplain), species richness (low medium, widespread), number of bird (Tod River floodplain, all wetlands), reptile (dunes, and higher on the edge dunes and seasonal wetlands) and mammal species (seasonal wetlands), number of butterfly species (beach ridges in the south of the cell), habitat for focal species Beach Slider and Bight Coast Skink (all dunes, except quarries), vegetation block metrics and wetland significance. Although the Tod River floodplain is only medium low on the combination of all conservation scores, it is clear that it is of significance as a bird habitat, including a number of threatened species and, focal species for this project, the Pied Oystercatcher.

The 2019 review showed two new native flora species records and no additional weed species records since the 2011 analysis with nine flora species records by the 2019 review. Seven flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of 54 additional native fauna species recorded since the 2011 analysis and one additional non-indigenous species, increasing the total number of fauna species records from 63 in 2011 to 109 by 2019. Six of the new fauna records include species with a conservation rating (excluding ssp) - the Australasian Shoveler, *Anas rhynchosotis rhynchosotis*, the Pacific Reef Heron (Eastern Reef Egret), *Egretta sacra*, the Bar-tailed Godwit, *Limosa lapponica*, and the Restless Flycatcher, *Myiagra inquieta*, all listed as

## Cell Descriptions – EP 25 Louth Bay

Rare under the *National Parks and Wildlife Act 1972* (NPW Act), and the Hooded Plover, *Thinornis cucullatus* and the Australian Sea Lion, *Neophoca cinerea* both listed as Vulnerable under NPW Act and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased, it is unlikely that this would be enough to raise the conservation rating of the cell to medium.

### Threat Analysis (GIS)

The threat total, 61.07, is high for the region. The distribution of total threats is striking: high values are found widely both within wetlands and beach ridges; no part of the cell has less than high-medium totals. Above average contributions to the threat total include ORV activity (in many places the beach ridges, the lower Tod floodplain and the seasonal wetlands have been heavily degraded), development zoning, land ownership (all areas of conservation significance are privately owned), viewshed and viewscape, land use, vegetation block degradation\* and presence of dangerous weeds\* (these two have high scores in regional terms; weed records in the dunes include African Boxthorn, Bridal Creeper, and Aleppo Pine), and dune instability. Quarrying is locally significant near Louth Bay township. The Lower Tod floodplain has potential for acid sulphate soils, if disturbed.

It is likely that the area impacted by ORV and informal campsites including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation, dune erosion and disturbance of shorebirds and nesting sites on the Lower Tod River plain. While there were no new weed species records identified in the 2019 data review, there are known occurrences of African Boxthorn and the proximity to agriculture brings with it, weedy grasses, and there are garden escapees associated with developed area eg Louth Bay township. The threat rating remains high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	The extensive low ground and lack of sand stage in the low beach ridges suggest this area could be sharply affected by erosion over time, due to sea level rise;	Active dune management; Establish a beach/nearshore profile line (located central in the	

## Cell Descriptions – EP 25 Louth Bay

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	Foredune erosion will contribute to dune destabilisation.	bay) for long-term monitoring of change.	
2070: +c.80cm	Acceleration of coastal erosion.	See above	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	Flooding of the lower Tod floodplain and the seasonal wetlands will increase in frequency;  Tidal flooding peaks will rise.	Establish a tidal flooding observation record pole near a point of ready public access, to raise public awareness of change;  Maintain on-ground photographic record, to inform adaptation.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Continued active dune management.	
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Drier conditions add to the stresses of isolated vegetation blocks; Opportunity created for more frequent weed invasion.	Monitor habitat change.	
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	The lower Tod River may, rarely, be affected by storm run-off leading to sediment movement and habitat change within the lower floodplain.	Monitor through aerial photographic record (see above).	
<b>Groundwater lowering; saline incursion:</b>	Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and habitat survival and change in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

Cell Descriptions – EP 25 Louth Bay

**TABLE 6.70 Recommended Actions and Priority Table for EP25 Louth Bay**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Climate change and ongoing and accelerating sea level rise beginning to cause change in dunes and wetlands.	Create a baseline for monitoring shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution;	High (cons/threat)	DEW, EP Landscape Board
		Establish tidal flooding observation pole to raise public awareness;	Medium (cons/threat)	Coast Protection Board, DC Lower Eyre Peninsula, EP Landscape Board,
		Establish a surveyed beach profile to begin a long record of beach change.	High (cons/threat)	DEW
				Coast Protection Board
	These areas are subject to pressure from weeds, number of exotic plants and ORV.	Local weed eradication and access control management including ORV.	High (Cons/threat)	EP Landscape Board, landowners community
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, DC Lower Eyre Peninsula, community
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons/threat))	DEW, EP Landscape Board

## Cell Descriptions – EP 25 Louth Bay

	Potential for grazing impacts on vegetation including degradation, spread of weeds and on the coastal landforms.	Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained).	Medium (cons/threat)	DEW, EP Landscape Board, landowners
	Informal and formal camping with impact from multiple tracks, soil compaction and soil erosion, vegetation damage and trampling and removal, fauna disturbance, increased fire risk, firewood collection and weed introduction.	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/ infrastructure. Install and/or maintain signage.	Medium (cons/threat)	EP Landscape Board, DEW, DC Lower Eyre Peninsula, SA Tourism, community, landowners.
Beaches and dunes/beach ridges	Rising tide heights and storms will lead to beach and foredune erosion.	Establish a surveyed profile line, at a central location within the bay, to begin a long-term record to inform adaptation.	High (cons/threat)	DEW
	This area is a significant habitat for threatened bird species, as well as a habitat for lizard species. It is a high threat area (combined threat GIS).	This area needs protection, including consideration for statutory protection.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia
Lower Tod River floodplain	This area is a significant habitat for threatened bird species and, focal species for this project, the Pied Oystercatcher. It is a high threat area (combined threat GIS).	This area needs protection, including consideration for statutory protection.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	292.22 HA (47.60% of the cell)
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## Cell Descriptions – EP 25 Louth Bay

<b># flora surveys / records</b>	0 (0*) surveys, 0 (0*) opportune sites, 8 (4*) Herbarium records
<b># flora in cell</b>	9 (16*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	3 (11*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study.

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Ehrharta calycina</i>	Perennial Veldt Grass	RA	6
<i>Oenothera stricta ssp. stricta</i>	Common Evening Primrose		0
<i>Reichardia tingitana</i>	False Sowthistle		3

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Atriplex suberecta</i>	Lagoon Saltbush		
<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel		
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Polycalymma stuartii</i>	Poached-egg Daisy		
<i>Pterostylis erythroconcha</i>	Red Shell-orchid		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	109 (63*) recorded – 107 (62*) birds, 1 (0*) reptile, 0 (0*) butterflies, 1 (1*) mammals, 0 (0*) amphibian (an additional 18 reptiles and 25 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 53 (11*) opportune sites
<b># of threatened fauna in cell</b>	16 (6*)
<b># of non-indigenous fauna</b>	4 (4*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.



**Non-indigenous fauna**

Species	Common Name	Class	Record
<i>Alauda arvensis</i>	Eurasian Skylark	Aves	x
<i>Passer domesticus</i>	House Sparrow	Aves	x
<i>Sturnus vulgaris</i>	Common Starling	Aves	x
<i>Turdus merula</i>	Common Blackbird	Aves	x
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

**Birds**

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Accipiter cirrocephalus cirrocephalus</i>	Collared Sparrowhawk		
<i>Anas castanea</i>	Chestnut Teal		
<i>Anas gracilis</i>	Grey Teal		
<i>Anas rhynchos rhyngchotis</i>	Australasian Shoveler		R
<i>Anas superciliosa</i>	Pacific Black Duck		
<i>Anthochaera carunculata</i>	Red Wattlebird		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Aythya australis</i>	Hardhead		
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Biziura lobata</i>	Musk Duck		R
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Chalcites basal</i>	Horsfield's Bronze Cuckoo		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Circus approximans</i>	Swamp Harrier		
<i>Circus assimilis</i>	Spotted Harrier		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Corvus sp.</i>	crows		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Cygnus atratus</i>	Black Swan		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Falco berigora</i>	Brown Falcon		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavicalis vireescens</i>	Singing Honeyeater		
<i>Glossopsitta concinna</i>	Musk Lorikeet		

Cell Descriptions – EP 25 Louth Bay

Species	Common Name	Aus status	SA status
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Lalage tricolor</i>	White-winged Triller		
<i>Larus pacificus</i>	Pacific Gull		
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater		ssp
<i>Limosa lapponica</i>	Bar-tailed Godwit	ssp	R
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck		
<i>Malurus cyaneus</i>	Superb Fairywren		
<i>Malurus cyaneus leggei</i>	Superb Fairywren (Mainland SA)		
<i>Malurus splendens</i>	Splendid Fairywren		
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Megalurus mathewsi</i>	Rufous Songlark		
<i>Melanodryas cucullata</i>	Hooded Robin		ssp
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Microeca fascinans</i>	Jacky Winter		ssp
<i>Milvus migrans</i>	Black Kite		
<i>Myiagra inquieta</i>	Restless Flycatcher		R
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Nesoptilotis leucotis</i>	White-eared Honeyeater		
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V
<i>Nycticorax caledonicus</i>	Nankeen Night Heron		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Pachycephala rufiventris rufiventris</i>	Rufous Whistler		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon ariel</i>	Fairy Martin		
<i>Petrochelidon nigricans</i>	Tree Martin		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phaps chalcoptera</i>	Common Bronzewing		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		
<i>Phylidonyris novaehollandiae novaehollandiae</i>	New Holland Honeyeater (mainland SA)		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Psephotellus varius</i>	Mulga Parrot		
<i>Purnella albifrons</i>	White-fronted Honeyeater		
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis</i>	White-browed Scrubwren		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Smicromnis brevirostris</i>	Weebill		

Cell Descriptions – EP 25 Louth Bay

Species	Common Name	Aus status	SA status
<i>Stagonopleura guttata</i>	Diamond Firetail		V
<i>Sternula nereis</i>	Fairy Tern	V	E
<i>Strepera versicolor</i>	Grey Currawong		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		
<i>Tadorna tadornoides</i>	Australian Shelduck		
<i>Taeniopygia guttata</i>	Zebra Finch		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Todiramphus sanctus</i>	Sacred Kingfisher		
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		
<i>Vanellus tricolor</i>	Banded Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

## Cell Descriptions – EP 25 Louth Bay

### Mammals

Species	Common Name	Aus status	SA status
<i>Neophoca cinerea</i>	Australian Sea Lion	V	V

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Pseudonaja affinis</i>	Dugite			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).  
 Blue = recorded in 2019, new since 2011

### Amphibians

No amphibian species recorded in 2011 or 2019 data.

**Cell EP 27 Port Lincoln**

Cell area 702.4 ha. Shoreline length 14.3 km.



Landforms

This cell is a gently sloping fluvial outwash plain, declining to a low rubble cliff, with a narrow sand and gravel beach, and fronted by sub-tidal bedrock platforms. This slope leads down from nearby low hills and is incised by a number of contemporary streams. In the north of the cell at North Shields, very low-lying land has the hazard potential both for storm tide flooding of small saltmarsh areas and on-going erosion of the soft rock bluffs backing the narrow beach.

Benthic Habitat

Dense seagrass (<200 m. wide in the south, and 2 km in the north of the cell), then bare sand is mapped offshore.

Biota

Remnant vegetation covers an area of 51.3 ha, 7% of in this cell. Data includes one flora survey site, eight opportune floras sites,

nine herbarium flora record sites, one fauna survey site and eight opportune fauna survey sites within the cell. Remnant patches near the northern fringes of Port Lincoln are mapped as *Acacia dodonaeifolia* tall shrubland over *Lepidosperma viscidum* mid sedges over *Gonocarpus mezzianus*, *Cheilanthes austrotenuifolia*, *Chrysocephalum apiculatum*. Low ground in the extreme north of the cell is recorded as *Tecticornia arbuscula* low shrubland.

Land Use/Land Ownership

Traditional lands of the Barngarla people.  
Highly developed privately owned land, with negligible amount of coastal Crown land.

Uses (Field visits and local reports)

- Township – City of Port Lincoln.
- Conservation – Reserves: Parnkalla Trail (DC Port Lincoln/DC Lower Eyre Peninsula).
- Commercial fishing – Charters, A-class fishing.
- Industry – Harbour; Port/Shipping; Port Lincoln wharf – grain and fish export.
- Aquaculture – Offshore (tuna, kingfish, mussels); land-based (abalone)
- Recreation and Tourism – Caravan park (2), shacks, sightseeing, nature, hiking, ecotourism (e.g. standup paddle boarding tours), swimming, snorkelling, fishing, camping (informal), dog walking, ORV use (four-wheel drives), boating.



## Cell Descriptions – EP 27 Port Lincoln

Boat launching – Beach (small beaches near North Shields); boat ramps (Axel Stenross, Billy Light's Point and Proper Bay).



**FIGURE 6.75 Port Lincoln. Photo: Coast Protection Board, 2018**

### Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Osprey).

Areas of remnant vegetation along the northern part of this cell that includes areas of the threatened *Acacia dodonaeifolia*.

### Threats (Field visits and local reports)

Industry – Discharges from city wharf (grain dust, fish waste).

Proximity to aquaculture – Increased nutrient loads, marine debris.

Over-fishing - Large recreational take.

Stormwater impacts – Erosion, marine pollution.

Uncontrolled access – ORV use, informal camping.

Feral animals – Rabbits, cats, foxes.

Weed infestation – Aleppo Pines, Italian Buckthorn, African Boxthorn, Cotoneaster, Polygala, and Olives from garden escapees, historical plantings.

Climate change – The coastal road from Port Lincoln runs close to eroding cliffs; a potential future sea level rise risk.

### Opportunities (Field visits and local reports)

Long term beach profile survey records at North Shields and near the Town Jetty Port Lincoln provide the opportunity to track and further understand coastal change at a time of sea level rise: this is not only of value in hazard assessment, but also in monitoring threat to conservation

## Cell Descriptions – EP 27 Port Lincoln

assets at soft rock coasts and saltmarsh. [The location of the profiles can be checked on 'Naturemaps' SA. This record is a Coast Protection Board initiative, maintained by Coast and Marine Branch, DEW].

DC of Lower Eyre and City of Port Lincoln Council could continue their work around walking tracks along the shoreline for improved amenity as well as continuing work on revegetation activities and management of environmental weeds.

Community groups – DEW to continue supporting the Friends of Parnkalla Trail to undertake weed control, maintenance of educational infrastructure and community education on threatened plants.

Local schools – A number of schools use Parnkalla Trail for educational opportunities – DEW support is required to continue these activities.

Development and implementation of a stormwater management plan has begun. DEW, City of Port Lincoln Council and other partners need to complete implementation.

Conservation – Continue threatened plant conservation at the eastern ends of the Cell (Parnkalla Trail).

Education – Marine debris: community and schools continue to undertake clean-ups and provide data to EP Landscape Board; Snorkelling: DEW and Experiencing Marine Sanctuaries (EMS) run guided snorkels for community at Shelley Beach; Intertidal reef surveys using existing Reef Watch Intertidal program could be introduced as a monitoring tool with community or school groups.

### Conservation Analysis (GIS)

The total of conservation means is low for the region. Few flora values are recorded; however records of all threatened fauna species, habitat for threatened bird species – remnant blocks near Pt Lincoln - (including sighting of the White bellied Sea Eagle), mammal and reptile habitat, sea views and indigenous heritage sites give above average totals for these variables. The distribution of detailed total means shows low values for much of the cell, but some remnant vegetation blocks in and near Port Lincoln's northern suburbs show moderate totals.

The 2019 review showed 33 new native flora species records and 22 additional weed species records since the 2011 analysis with 127 flora species records by the 2019 review. One of the new Native Flora Species has a conservation rating - Hop-bush Wattle, *Acacia dodonaeifolia*, listed as Rare under the *National Parks and Wildlife Act, 1972* (NPW Act). 19 flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of nine additional native fauna species recorded since the 2011 analysis and three additional non-indigenous species, bringing the total number of fauna species records to 86 by 2019 compared with 75 in 2011. One of the new fauna records include species with a conservation rating (excluding ssp) - the Yellow-tailed Black Cockatoo, *Calyptorhynchus (Zanda) funereus whiteae*, listed as Vulnerable under the NPW Act. If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased, it is unlikely that this would be enough to raise the conservation rating of the cell to medium.

### Threat Analysis (GIS)

The threat total 61.84 is very high for the region: the detailed summary map of means shows high totals throughout the cell. Multiple threats contribute to this total: ORV, land ownership and land use, development zoning, existing development, viewshed, vegetation block degradation (number of exotic species), and distribution of dangerous weeds. The GIS analysis

## Cell Descriptions – EP 27 Port Lincoln

confirms this as the most developed cell (urban and farming) in the region; weeds threaten the remaining vegetation blocks, as do ORV.

It is likely that the area impacted by ORV access including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation, dune erosion and disturbance of shorebirds and nesting sites. Areas of remnant vegetation along the northern part of this cell that includes areas of the threatened *Acacia dodonaeifolia* which are threatened from weed invasion and inappropriate access.

There were 22 additional weed species records identified in the 2019 data review. There are known occurrences of African Boxthorn and the proximity to agriculture is a source of weedy grasses. There are also garden plant escapes associated with developed areas eg Port Lincoln township. Three of the new weed records include Declared species Buffel Grass - *Cenchrus ciliaris*, Fountain Grass - *Cenchrus setaceus* and Coast Tea-tree - *Leptospermum laevigatum*. The threat rating remains high.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

The highly modified nature of the coastal lands of this cell, and the small remaining habitats, suggest the impacts of climate change will depend greatly on ongoing response to change and urban risk assessment. These are largely outside the outside the scope of this project; but the small areas of inter-tidal flora and cliff top shrubland will be greatly affected by changing tide heights and erosion.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Soft Pleistocene sediments and low sand volumes over basement rocks and nearshore reefs will be prone to accelerated erosion. Flood frequency increase potential to samphire shrublands increased.	Establish a cliff recession survey marker system, to monitor this change. (Continue to maintain profile record at North Shields to track local processes and change).	
2070: +c.80cm	Narrow high tide beaches fronting bluffs lost; bluffs and cliffs recede rapidly. Low sand storage make this cell prone to erosion from sea level rise and storms.	Continue to monitor shoreline processes and state of cliff erosion.	



## Cell Descriptions – EP 27 Port Lincoln

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<p><b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases</p>	<p>2030: Occasional storm tide flooding above highest known tides; damage to foredunes Tidal flooding of low-lying ground near North Shields unless sea wall maintained.</p>	<p>Continue to monitor shoreline processes and state of sea wall.</p>	
<p><b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C</p>	<p>Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere; Lack of connectivity between vegetation block habitats is an issue in this cell.</p>		<p>Maintain and improve connectivity of vegetation within and adjacent to the coastal boundary.</p>
<p><b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%</p>	<p>Drier conditions add to the stresses of isolated vegetation blocks; Opportunity created for more frequent weed invasion.</p>	<p>Monitor habitat change.</p>	
<p><b>'Flashy' run off:</b> Drier creeks, but larger rare floods</p>	<p>Small incised creeks drain the alluvial slopes of the coastal plain: erosion of creek bed and banks in local storms threaten both creek mouth/cliff erosion, and deposition of sediment in the nearshore. Storm drain infrastructure can become overwhelmed in peak events; peaks also in pollution transport to bay.</p>	<p>Monitor creek mouth erosion; Reduce potential for fast overland run-off through catchment land management measures as needed.</p>	
<p><b>Groundwater lowering; saline incursion:</b></p>	<p>Saline groundwater incursion into nearshore lowlands.</p>	<p>Monitor groundwater in order to manage soil and plant assets.</p>	
<p><b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C</p>	<p>Persistent swell wave climate maintains sediment movement.</p>		

**TABLE 6.71 Recommended Actions and Priority for EP27 Port Lincoln**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Climate change and ongoing and accelerating sea level rise beginning to cause significant erosion in some areas and change in unstable cliffs.	Create a baseline for monitoring shoreline change by establishing a rectified aerial photographic record at an appropriate resolution;	High (cons/threat)	DEW, EP Landscape Board
		Maintain profile monitoring at vulnerable sites.	High Cons/threat	DEW Coast Protection Board
	This area is a significant habitat for threatened bird species and, focal species for this project. eg. the Pied Oystercatcher, Fairy Tern and Rock Parrot.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season; improve management of nesting site(s), access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage.	High (cons/threat)	DEW EP Landscape Board, Birds Australia
Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, cats. Undertake a control program if required.	Medium (cons/threat)	EP Landscape Board, DC Lower Eyre Peninsula, landowners,	

## Cell Descriptions – EP 27 Port Lincoln

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.)	Medium (cons/threat)	EP Landscape Board, City of Port Lincoln community
	Potential pollution or habitat degradation from increased nutrients from discharges.	Monitor impacts of marine discharge.	High (cons/threat)	DC Lower Eyre Peninsula, City of Port Lincoln EPA, PIRSA
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, landowners, community groups, City of Port Lincoln and DC Lower Eyre Peninsula, EP Landscape Board, DEW, DPC
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons threat)	DEW, EP Landscape Board
	These areas are subject to pressure from weeds, and the presence of exotic plants (African Boxthorn, Italian Buckthorn, Aleppo Pine, cotoneaster, Polygala, Olives).	Develop and implement a weed management plan (including monitoring and recording weed species removal and rehabilitation as required) to protect valuable habitat. Undertake education program on impacts of garden escape plants and weed control program.	High (cons/threat)	EP Landscape Board, landowners, DC Lower Eyre Peninsula, City of Port Lincoln
	Amenity and access management of walking trails.	Upgrading of walking trails to improve amenity and undertaking access management and control to areas where access by vehicles is inappropriate.	Medium (cons)	DC Lower Eyre Peninsula, City of Port Lincoln, DEW, EP Landscape Board

## Cell Descriptions – EP 27 Port Lincoln

Component	Issue	Proposed Action	Priority of Action	Key Players
		A number of schools use Parnkalla Trail for educational opportunities. Continue to support these activities.		
	Threatened plants at the eastern end of the cell. Management actions put in place to maximise their survival and manage impacts from agricultural activities, recreational activities, feral animals and land management practices.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas. eg. restrict access to sensitive locations, restrict stock access, track management, restrict vehicles access, pest animal and plant control, Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage.	High (cons/threat)	DEW, EP Landscape Board, DC Lower Eyre Peninsula, City of Port Lincoln
Township areas	Stormwater management.	Township could use infrastructure upgrades such as rain gardens to improve water quality as it enters the ocean.	Medium (threat)	City of Port Lincoln, EP Landscape Board, EPA, community
	Garden escapees, particularly succulents.	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants.	Medium (cons/threat)	EP Landscape Board, DC Port Lincoln, community
Intertidal Reefs	Monitoring health of intertidal reefs.	Opportunity to set up intertidal reef surveys using existing Reef Watch Intertidal program could be introduced as a monitoring tool with community or school groups.	Medium (cons)	DEW EP Landscape Board, Reef Watch SA community, school groups

## Cell Descriptions – EP 27 Port Lincoln

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	51.18 HA (7.29% of the cell)
<b># flora surveys / records</b>	1 (0*) surveys, 8 (0*) opportune sites, 9 (13*) Herbarium records
<b># flora in cell</b>	127 (89*)
<b># conservation rated flora in cell</b>	5 (4*)
<b># non-indigenous flora in cell</b>	40 (28*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	None of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	Bridal Creeper	D, RA	(9)
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avena</i> sp.	Oat		-
<i>Briza maxima</i>	Large Quaking-grass		0
<i>Carduus tenuiflorus</i>	Slender Thistle	D	2
<i>Cenchrus ciliaris</i>	Buffel Grass	D	-
<i>Cenchrus setaceus</i>	Fountain Grass	D	-
<i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i>	Boneseed	D	6
<i>Clematis flammula</i>			-
<i>Clematis vitalba</i>	Traveller's Joy		0
<i>Consolida ajacis</i>	Eastern Larkspur		0
<i>Conyza bonariensis</i>	Flax-leaf Fleabane		0
<i>Cotoneaster pannosus</i>	Cotoneaster		-
<i>Crassula natans</i> var. <i>minus</i>	Water Crassula		0
<i>Cymbalaria muralis</i>	Ivy-leaf Toadflax		
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3
<i>Euphorbia serpens</i>	Matted Sandmat		-
<i>Foeniculum vulgare</i>	Fennel		-
<i>Hordeum vulgare</i> ssp. (NC)			-
<i>Ixia viridiflora</i>	Green Ixia		0
<i>Leptospermum laevigatum</i>	Coast Tea-tree	D	5
<i>Oxalis pes-caprae</i>	Soursob	D, RA	5
<i>Paspalum</i> sp.			-
<i>Phalaris aquatica</i>	Phalaris		-
<i>Phalaris</i> sp.	Canary Grass		-
<i>Pinus</i> sp.	Pine		-
<i>Poa annua</i>	Winter Grass		-

## Cell Descriptions – EP 27 Port Lincoln

Species	Common Name	Status	Study rating
<i>Rhamnus alaternus</i>	Blowfly Bush	D, RA	8
<i>Rosa canina</i>	Dog Rose	D	1
<i>Rosa</i> sp.	Wild Rose/Briar		-
<i>Rubus anglocandicans</i>			-
<i>Rumex crispus</i>	Curled Dock		-
<i>Salvia verbenaca</i> var.	Wild Sage		-
<i>Scabiosa atropurpurea</i>	Pincushion		3
<i>Setaria verticillata</i>	Whorled Pigeon-grass		-
<i>Solanum nigrum</i>	Black Nightshade		2
<i>Sparaxis bulbifera</i>	Sparaxis		3
<i>Spartium junceum</i>	Spanish Broom		-

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia cupularis</i>	Cup Wattle		
<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R
<i>Acacia leiophylla</i>	Coast Golden Wattle		
<i>Acacia longifolia</i> ssp. <i>sophorae</i>	Coastal Wattle		
<i>Acacia paradoxa</i>	Kangaroo Thorn		
<i>Acacia pycnantha</i>	Golden Wattle		
<i>Acacia spinescens</i>	Spiny Wattle		
<i>Acrotriche cordata</i>	Blunt-leaf Ground-berry		
<i>Acrotriche patula</i>	Prickly Ground-berry		
<i>Allocasuarina verticillata</i>	Drooping Sheoak		
<i>Alyxia buxifolia</i>	Sea Box		
<i>Astroloma humifusum</i>	Cranberry Heath		
<i>Austrostipa exilis</i>	Heath Spear-grass		
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Austrostipa mollis</i>	Soft Spear-grass		
<i>Austrostipa mundula</i>	Neat Spear-grass		
<i>Austrostipa semibarbata</i>	Fibrous Spear-grass		
<i>Austrostipa</i> sp.	Spear-grass		
<i>Beyeria lechenaultii</i>	Pale Turpentine Bush		
<i>Billardiera sericophora</i>	Silky Apple-berry		
<i>Bursaria spinosa</i> ssp.	Bursaria		
<i>Bursaria spinosa</i> ssp. <i>spinosa</i>	Sweet Bursaria		
<i>Carpobrotus rossii</i>	Native Pigface		
<i>Cassytha glabella</i> f. <i>dispar</i>	Slender Dodder-laurel		
<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel		
<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern		
<i>Cheiranthra alternifolia</i>	Hand-flower		
<i>Chrysocephalum apiculatum</i>	Common Everlasting		
<i>Clematis microphylla</i>	Old Man's Beard		
<i>Correa pulchella</i>	Salmon Correa		
<i>Dianella revoluta</i> var.			

Cell Descriptions – EP 27 Port Lincoln

Species	Common Name	Aus status	SA status
<i>Dodonaea baueri</i>	Crinkled Hop-bush		
<i>Enneapogon nigricans</i>	Black-head Grass		
<i>Enteromorpha paradoxa</i>			
<i>Eremophila bebriana</i>	Rough Emubush		
<i>Eucalyptus conglobata</i> ssp. <i>conglobata</i>	Port Lincoln Mallee		R
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>	Coastal White Mallee		
<i>Eucalyptus oleosa</i> ssp. <i>ampliata</i>	Red Mallee		
<i>Eucalyptus peninsularis</i>	Merrit		
<i>Eucalyptus petiolaris</i>	Eyre Peninsula Blue Gum		
<i>Euphorbia</i> sp. (NC)	Spurge		
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Exocarpos syrticola</i>	Coast Cherry		
<i>Goodenia robusta</i>	Woolly Goodenia		
<i>Goodenia varia</i>	Sticky Goodenia		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Gramineae</i> sp.	Grass Family		
<i>Grevillea aspera</i>	Rough Grevillea		
<i>Haeckeria cassiniiformis</i>	Dogwood Haeckeria		R
<i>Haloragis acutangula</i> f. <i>acutangula</i>	Smooth Raspwort		
<i>Haloragis acutangula</i> f. <i>turbinata</i>	Smooth Raspwort		
<i>Hardenbergia violacea</i>	Native Lilac		
<i>Hemichroa diandra</i>	Mallee Hemichroa		
<i>Lasiopetalum discolor</i>	Coast Velvet-bush		
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge		
<i>Leucopogon cordifolius</i>	Heart-leaf Beard-heath		
<i>Logania ovata</i>	Oval-leaf Logania		
<i>Lomandra collina</i>	Sand Mat-rush		
<i>Lysiana exocarpi</i> ssp. <i>exocarpi</i>	Harlequin Mistletoe		
<i>Malva preissiana</i> (NC)	Australian Hollyhock		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Microcybe pauciflora</i> ssp. <i>pauciflora</i>	Yellow Microcybe		
<i>Myoporum brevipes</i>	Warty Boobiella		
<i>Myoporum insulare</i>	Common Boobiella		
<i>Neurachne alopecuroidea</i>	Fox-tail Mulga-grass		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia ramulosa</i>	Twiggy Daisy-bush		
<i>Opercularia scabrida</i>	Stalked Stinkweed		
<i>Oxalis perennans</i>	Native Sorrel		
<i>Pimelea glauca</i>	Smooth Riceflower		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Prostanthera serpyllifolia</i> ssp. <i>microphylla</i>	Small-leaf Mintbush		
<i>Prostanthera serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme Mintbush		
<i>Pultenaea acerosa</i>	Bristly Bush-pea		
<i>Rhagodia candolleana</i> ssp.	Sea-berry Saltbush		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Samolus repens</i>	Creeping Brookweed		
<i>Santalum acuminatum</i>	Quandong		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Scaevola linearis</i> ssp. <i>linearis</i>	Rough Fanflower		
<i>Schoenus deformis</i>	Small Bog-rush		
<i>Sebaea ovata</i>	Yellow Sebaea		

## Cell Descriptions – EP 27 Port Lincoln

Species	Common Name	Aus status	SA status
<i>Sonchus hydrophilus</i>	Native Sow-thistle		
<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R
<i>Templetonia retusa</i>	Cockies Tongue		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Themeda triandra</i>	Kangaroo Grass		
<i>Thysanotus nudicaulis</i>			E

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	86 (75*) recorded – 78 (69*) birds, 3 (3*) reptile, 0 (0*) butterflies, 2 (0*) mammals, 3 (3*) amphibian (an additional (16*) reptiles and (25*) butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	1 (0*) survey sites, 8 (30*) opportune sites
<b># of threatened fauna in cell</b>	8 (6*)
<b># of non-indigenous fauna</b>	7 (4*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Alauda arvensis</i>	Eurasian Skylark	Aves	
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Spilopelia chinensis</i>	Spotted Dove	Aves	
<i>Streptopelia risoria</i>	Barbary Dove	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Accipiter fasciatus</i>	Brown Goshawk		
<i>Anas castanea</i>	Chestnut Teal		
<i>Anas gracilis</i>	Grey Teal		
<i>Anas superciliosa</i>	Pacific Black Duck		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Ardea alba modesta</i>	Great Egret		
<i>Aythya australis</i>	Hardhead		



Cell Descriptions – EP 27 Port Lincoln

Species	Common Name	Aus status	SA status
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo		
<i>Calyptorhynchus (Zanda) funereus whiteae</i>	Yellow-tailed Black Cockatoo		V
<i>Cereopsis novaehollandiae novaehollandiae</i>	Cape Barren Goose		R
<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Corvus coronoides</i>	Australian Raven		
<i>Cygnus atratus</i>	Black Swan		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Fulica atra</i>	Eurasian Coot		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Gerygone fusca fusca</i>	Western Gerygone (EP)		ssp
<i>Glossopsitta concinna</i>	Musk Lorikeet		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Himantopus leucocephalus</i>	White-headed Stilt		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R
<i>Malurus cyaneus</i>	Superb Fairywren		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Megalurus gramineus</i>	Little Grassbird		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Mirafra javanica</i>	Horsfield's Bush Lark		
<i>Morus serrator</i>	Australasian Gannet		
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Pardalotus punctatus</i>	Spotted Pardalote		
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax carbo</i>	Great Cormorant		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phaps chalcoptera</i>	Common Bronzewing		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Porzana fluminea</i>	Australian Crake (Australian Spotted Crake)		
<i>Psephotellus varius</i>	Mulga Parrot		
<i>Purnella albifrons</i>	White-fronted Honeyeater		
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		
<i>Rhipidura albiscapa</i>	Grey Fantail		

## Cell Descriptions – EP 27 Port Lincoln

Species	Common Name	Aus status	SA status
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Strepera versicolor intermedia</i>	Brown Currawong		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		
<i>Tadorna tadornoides</i>	Australian Shelduck		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammal species recorded in 2011.

## Cell Descriptions – EP 27 Port Lincoln

Species	Common Name	Aus status	SA status
<i>Neophoca cinerea</i>	Australian Sea Lion	VU	V
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Reptiles

No new reptile records since 2011.

Species	Common Name	Aus status	SA status	Record
<i>Ctenophorus fionni</i>	Eyre Peninsula Dragon			
<i>Pseudonaja inframacula</i>	Peninsula Brown Snake			
<i>Tiliqua occipitalis</i>	Western Bluetongue			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

Blue = recorded in 2019, new since 2011

### Amphibians

No new amphibian records since 2011.

Species	Common Name	Aus status	SA status
<i>Crinia signifera</i>	Common Froglet		
<i>Limnodynastes dumerilii</i>	Banjo Frog		
<i>Litoria ewingii</i>	Brown Tree Frog		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Cell EP 35 Cathedral Rocks

Cell area 848 ha. Shoreline length 18.86 km.



#### Landforms

This cell is a Pleistocene calcarenite plain well exposed in the medium to high cliffs. Early Precambrian basement gneiss and granite, underlying the calcarenite, is seen in reefs and platforms along the shore. Basement rock sloping shore platforms (“ramps”) are found below high (50m+) calcarenite cliffs at both ends of the cell; these cliffs are being actively eroded and frequently show signs of cliff collapse and rockfall. No beaches are found and wave energy is high throughout the shoreline of the cell. Holocene sands are present in low cliff top dunes and sheets in the SE of the cell. The calcarenite surface forms an uneven coastal plain: in places short first order stream valleys are truncated at the cliff line.

#### Benthic Habitat

Inshore granite reef and offshore bare sand.

#### Biota

Remnant vegetation covers an area of 746 ha, 88% of in this cell. There is one herbarium record site, two opportune flora survey sites, and 21 opportune fauna survey sites in this large cell. In two thirds of the NW of the cell, *Leucopogon parviflorus*, +/- *Olearia axillaris* mid open shrubland over *Rhagodia candolleana ssp. candolleana*, *Isolepis nodosa*, *Lepidosperma gladiatum*, +/- *Lasiopetalum discolor* low shrubs over *Carpobrotus rossii* is found, from the clifftops to c. 400m, then *Eucalyptus diversifolia ssp. diversifolia* mid open mallee forest over *Melaleuca lanceolata* (mixed) tall shrubs. In the SE of the cell *Callitris canescens*, +/- *Eucalyptus diversifolia ssp. diversifolia* low woodland over *Acrotriche patula*, *Melaleuca decussata* low shrubs is mapped from the clifftops to the inner coastal boundary.



**FIGURE 6.76 High energy coast, basement reefs, and high calcarenite cliffs in a massive Pleistocene barrier. Windfarm on unalienated Crown land and Vegetation Heritage Agreement land. Photo: Coast Protection Board, 2018**

Land Use/ Land Ownership

Traditional lands of the Naou people.

Adjoins Thorny Passage Marine Park (GMUZ-5).

55% is part of one large Heritage Agreement (HA1291: vegetated cliffs and plateau in S half).

41% of vegetated areas not protected. 18% is unalienated Crown land (cliff-top coastal reserve in the Southern half of the cell).

Cliff-top wind farm along unalienated Crown land and Vegetation Heritage Agreement land.

Uses (Field visits and local reports)

Conservation – Heritage Agreements cover most privately-owned land within the Cell; Coastal strip of unalienated Crown land.

Commercial fishing – Abalone, Rock lobster.

Recreation & Tourism – Recreational fishing, ORV use (no public access - employees and landholder access only).

Wind farm.

Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Raptors).

Rocky reef, sandy bottom, cliffs.



## Cell Descriptions – EP 35 Cathedral Rocks

### Threats (Field visits and local reports)

Development – Wind farm development and access has contributed to dune erosion through vegetation loss; possible future development of desalination plant.

Feral animals – Cats, rabbits, foxes.

### Opportunities (Field visits and local reports)

Opportunity for coastal management plans to be developed and implemented by DEW, EP Landscape Board and SA Water, with particular emphasis on pest plant and animal control and access control eg. Conservation and improvement works. DEW to continue to work with landowners with Heritage Agreements over their coastal land to restrict stock access to these areas and manage threats such as environmental weeds and vertebrate pests. Remove stock and fence boundary between coastal crown and private land and/or restrict stock access to privately owned sensitive coastal features eg. dunes, clifftops, clifftop dunes, etc. Undertake pest animal and plant management planning and control works on unallotted Crown land.

### Conservation Analysis (GIS)

95.9, the total of conservation means, is a medium score for the region. Floristic vegetation endemic to this region, numbers of threatened birds species and reptile species, numbers of butterfly species, viewscape and viewshed, and vegetation block metrics make up the above average contributions to this total. There are several other layers that are represented: coastal dune and clifftop survey plant associations; threatened status of flora and fauna; number of threatened species; species richness; number of reptile species; number of mammal species and threatened mammal species; focal species Eastern Osprey (NW section of HA land), Beach Slider and Bight Coast Skink (all dune areas); European Heritage.

The 2019 review showed two new native flora species records and one additional weed species record since the 2011 analysis with 11 flora species records by the 2019 review, increasing from eight in 2011. The 2019 review showed an increase of seven additional native fauna species recorded since the 2011 analysis, increasing the total number of fauna species records from two to nine by 2019. One of the new fauna records include species with a conservation rating (excluding ssp) - the Purple-gaped Honeyeater (mainland SA), *Lichenostomus cratitius occidentalis*, listed as Rare under the *National Parks and Wildlife Act*, 1972. If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased slightly, this would not be enough to raise the conservation rating of the cell to High. The rating would remain medium.

### Threat Analysis (GIS)

The threat total of 28.757 is low for the region and none of the following contributing layers show a high total, except cliff instability reflecting the height, prevalence of soft rock cliffs and the high wave energy in the area. ORV tracks and informal camping, vegetation degradation, and weeds all make relatively minor contributions; visual amenity scores highly, although this may be qualified by the construction of a wind farm, constructed after the viewscape assessment.

The one new weed species record (Bridal Creeper, *Asparagus asparagoides f. asparagoides*) identified in the 2019 data review, is both a Red Alert and a Declared weed species, which challenges the habitat value of this extensive area of native vegetation. Overall, the threat rating remains low.

## Cell Descriptions – EP 35 Cathedral Rocks

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Sea level rise increases rate of cliff erosion, most notably behind reefs.		
2070: +c.80cm	As above.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases			
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain; Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Plant habitats adapt to drier conditions, but recover more slowly from fire, disease and weed invasion.	Monitor bush condition.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	NA		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b>			

## Cell Descriptions – EP 35 Cathedral Rocks

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C			

**TABLE 6.72 Recommended Actions and Priority for EP35 Cathedral Rocks**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole Cell	Ongoing and accelerating sea level beginning to cause vegetation change; Increasing aridity due to climate encourages grassy weed invasion.	Create a baseline for monitoring vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Invasion of exotic plants and weeds (including Bridal Creeper) challenges the habitat value of this extensive area of native vegetation.	Continue to assist landholders develop and implement weed management plan, including control works and access control works as required.	High (cons/threat)	EP Landscape Board, DEW, landowners
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, Lower Eyre Peninsula Council, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, cats. Undertake a control program if required.	Medium (cons/threat)	EP Landscape Board, Lower Eyre Peninsula Council, landowners
	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High(cons)	DEW, EP Landscape Board



## Cell Descriptions – EP 35 Cathedral Rocks

Component	Issue	Proposed Action	Priority of Action	Key Players
	This cell has habitat values for a number of threatened species, including focal species for this report with potential impacts from agricultural activities, recreational activities, feral animals and land management practices	Monitor habitats for these species in order to manage adaptively.	Medium (cons/threat)	EP Landscape Board, DEW
Coastal cliff-top dunes	Wind farm development and access has contributed to dune erosion through vegetation loss. ORV activity, car parks and informal camping damaging vegetation, cliff top dunes, soil compaction, soil instability, fauna disturbance, weed introduction and causing runoff erosion. Some informal car parks, vehicle and pedestrian tracks close to potentially unstable cliff edge; safety hazard. Also, cliff-top dunes recover more slowly from damage with increasing aridity.	Coastal management plans could be developed and implemented by DEW, with particular emphasis on pest plant and animal control and access control. Review with a view to rationalise unnecessary tracks and car parks. Close or reroute tracks and car parks close to cliff edge. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined or are causing water run-off erosion. Formalise and maintain pedestrian access. Install directional/ educational signage where required.	Medium (cons/threat)	DEW, landowners
Heritage Agreements	Maintain integrity of remnant vegetation areas and fauna within Vegetation Heritage Agreements.	DEW to continue to support Vegetation Heritage Agreement landowners on coastal land to improve management and protection of high conservation areas and mitigate threats.	Medium (cons/threat)	DEW, EP Landscape Board, landowners

## Cell Descriptions – EP 35 Cathedral Rocks

Component	Issue	Proposed Action	Priority of Action	Key Players
	Manage stock access to these areas and manage threats such as environmental weeds and vertebrate pests.	Work with private landowners to ensure that stock are restricted from the unallotted Crown land and other areas of high conservation value and/or sensitive features (eg. clifftop dunes) by ensuring fences are adequate and maintained. Eg. to restrict stock access to these areas and manage threats such as environmental weeds and vertebrate pests. Conservation and improvement works on extensive Heritage Agreement land.	Medium (cons/threat)	DEW, EP Landscape Board, landowners

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	746.18 ha (87.96% of the cell)
<b># flora surveys / records</b>	0 (0*) surveys, 2 (0*) opportune sites, 1 (1*) Herbarium record
<b># flora in cell</b>	11 (8*)
<b># conservation rated flora in cell</b>	1 (1*)
<b># non-indigenous flora in cell</b>	2 (1*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	58.69% of the vegetation in the cell is protected.

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asparagus asparagoides f. asparagoides</i>	Bridal Creeper	D, RA	9
<i>Silene nocturna</i>	Mediterranean Catchfly		1

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

## Cell Descriptions – EP35 Cathedral Rocks

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia alcockii</i>	Alcock's Wattle		R
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Comesperma volubile</i>	Love Creeper		
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>	Coastal White Mallee		
<i>Ixodia achillaeoides</i> ssp. <i>achillaeoides</i>	Coast Ixodia		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Orthrosanthus multiflorus</i>	Morning Flag		
<i>Pultenaea rigida</i>	Rigid Bush-pea		
<i>Pultenaea tenuifolia</i>	Narrow-leaf Bush-pea		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	9 (2*) recorded – 9 (2*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 23 reptiles and 24 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 21 (40*) opportune sites
<b># of threatened fauna in cell</b>	3 (2*)
<b># of non-indigenous fauna</b>	0 (0*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

No non-indigenous fauna records for 2011 or 2019.

Species	Common Name	Class	Record
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Calamanthus (Calamanthus) campestris</i>	Rufous Fieldwren (Nullarbor, EP, GR, YP, southern FR, MLR, LNE)		
<i>Dromaius novaehollandiae</i>	Emu		
<i>Drymodes brunneopygia</i>	Southern Scrub Robin		
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater (mainland SA)		R
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Psophodes nigrogularis leucogaster</i>	Western Whipbird (Eastern)	V	E
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	V	E
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

## Cell Descriptions – EP35 Cathedral Rocks

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otares</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinesthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammal species recorded in 2011 or 2019.

### Reptiles

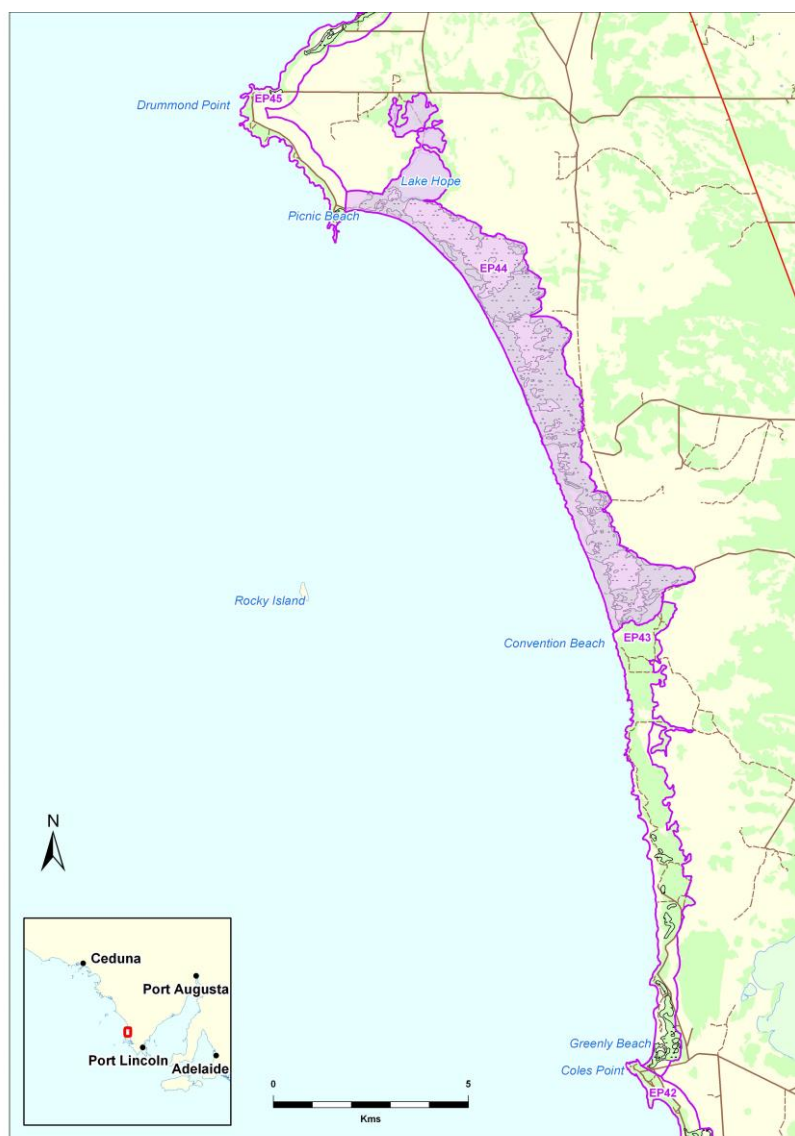
No reptile species recorded in 2011 or 2019.

### Amphibians

No amphibian species recorded in 2011 or 2019.

### Cell EP 44 Mount Drummond

Cell area 1912 ha. Shoreline length 62.7 km.



#### Landforms

This cell consists almost entirely of a transgressive Holocene sand barrier that extends up to 1.7 km from the shore; the dunes show current transgression, as well as movement in the past, subsequently vegetated. The shoreline is almost entirely a high energy, reflective, beach with fine-medium sands. A small area of back barrier flats at the northern end of the cell includes sabkha Lake Hope at the boundary of the cell. An undulating Pleistocene calcarenite plain underlies the Holocene dunes; the calcarenite is seen in low bluffs at the back of the beach at the northern end of the cell; and in low cliffs at the southern end.

#### Benthic Habitat

Mapped as bare sand offshore.

#### Biota

Remnant vegetation covers an area of 1082 ha, 57% of the cell. There are three flora survey sites, three herbarium record sites, three opportune flora survey sites and 16 opportune fauna survey sites. Much of the vegetated dune is *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa*, *Tetragonia implexicoma*, *Rhagodia candolleana ssp. candolleana*, *Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa*, *Dianella brevicaulis*. However, the frontal dunes in the north of the cell are *Atriplex cinerea*, *Leucophyta brownii*, *Pimelea serpyllifolia ssp. serpyllifolia* mid open shrubland over *Rhagodia candolleana ssp. candolleana*, *Zygophyllum apiculatum*, *Tetragonia implexicoma*, *Threlkeldia diffusa*, *Isolepis nodosa* low shrubs. Also, *Melaleuca balmaturorum* over *Gabnia trifida* is mapped along drainage lines near Lake Hope; *Tecticornia sp.* low sparse shrubland over *Disphyma crassifolium ssp. Clavellatum* is mapped in the extreme north of the cell.

#### Land Use/ Land Ownership

Traditional lands of the Naou people.

## Cell Descriptions – EP 44 Mount Drummond

Three large Heritage Agreement areas occupy approximately 50% of the entire area of the cell. Picnic Beach and the dunes in the south of the cell are Crown leasehold; a narrow coastal reserve and Lake Hope are unalienated Crown land. The cell abuts Thorny Passage Marine Park.



**FIGURE 6.77 Picnic Beach, northern end of EP44: high energy reflective beach; low calcarenite bluff; transgressive dunes; Lake Hope in background. Photo: Coast Protection Board, 2018**

### Uses (Field visits and local reports)

Conservation – Heritage Agreements; Crown Reserve and Crown Lease.

Agriculture – Grazing (small areas).

Recreation & Tourism – Sightseeing, nature, whale watching, hiking, swimming, surfing, recreational fishing, camping (informal), dog walking, ORV use (four-wheel drive, motorbike).

### Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Oyster Catchers, Greater and Lesser sand Plovers, Hooded Plovers and other shorebirds).

### Threats (Field visits and local reports)

Agriculture – Grazing (limited).

Ecotourism ventures – Tours to Picnic Beach.

Pollution – Marine debris.

Uncontrolled access – ORV use, informal camping leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.



## Cell Descriptions – EP 44 Mount Drummond

Feral animals – Cats, rabbits, foxes.

Weed infestation - African Boxthorn, Italian Buckthorn (garden escapees).

### Opportunities (Field visits and local reports)

Opportunities for coastal management plans to be developed in collaboration with landholders, DEW, EP Landscape Board and DC Lower Eyre, with particular emphasis on pest plant and animal control and access control. Build on existing weed control program by DEW and landowners to control African Boxthorn and Italian Buckthorn and continue to work with landowners with Heritage Agreements over their coastal land to manage threats.

### Conservation Analysis (GIS)

The conservation means for this cell total 96.44: a medium score for the region. The combined detailed conservation map shows a clear pattern: vegetated dune has a medium-high total; all other areas have low or low medium totals. The layers making major contribution to the total score include: state rarity of plant species, state endemism of plant associations (notably at the southern part of HA 1425), threatened birds habitat (Lake Hope and the inner parts of the dunes), threatened reptile habitat (notably inner dunes near southern boundary of cell), threatened mammal habitat, habitat for focal species Bight Coast Skink and Beach Slider (all dunes), viewscape, viewshed and vegetation metrics. Several other layers contribute to the total: priority for threatened status of fauna (highest scores on de-vegetated dunes), national endemism of plant associations (most vegetated dunes), species richness, number of reptile and mammal species, and habitat for butterfly species (notably HA 1425 and 1367, and the southern section of the cell).

The 2019 review showed five new native flora species records and two additional weed species records since the 2011 analysis with 101 flora species records by the 2019 review compared with 97 in 2011. Three flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed an increase of 34 additional native fauna species recorded since the 2011 analysis, bringing the total number of fauna species records to 37 by 2019 compared with four in 2011. Eight of the new fauna records include species with a conservation rating (excluding ssp) - the Ruddy Turnstone, *Arenaria interpres*, Sanderling, *Calidris alba*, Peregrine Falcon, *Falco peregrinus*, Sooty Oystercatcher, *Haematopus fuliginosus*, (Australian) Pied Oystercatcher, *Haematopus longirostris*, both listed as rare under the *National Parks and Wildlife Act 1972* (NPW Act), the Greater Sand Plover, *Charadrius leschenaultia*, listed as rare under the NPW Act and vulnerable under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Lesser Sand Plover, *Charadrius mongolus* listed as rare under the NPW Act and endangered under the EPBC Act. If the analysis were repeated for this cell, even though flora species richness and number of threatened bird species has increased significantly, overall this would not be enough to raise the conservation rating of the cell to High. The rating would remain medium.

### Threat Analysis (GIS)

The total of threat means is 43.879, a medium score for the region. The combined detailed threat map shows high totals at Lake Hope and in the south of the cell, also at Picnic Beach and at a number of points at inner edge of the dune. ORV activity is high in the dune Crown leasehold land at the extreme south of the cell, but slight elsewhere. Viewshed and viewscape scores are high. Exotic plants at a high level (more than 20% of recorded species) are found through all vegetated areas. Dangerous weeds appear notably recorded in HA 1301.

## Cell Descriptions – EP 44 Mount Drummond

It is likely that the area impacted by ORV and informal campsites including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation, dune erosion and disturbance of shorebirds and nesting sites. There were two new weed species records identified in the 2019 data review and known occurrences of African Boxthorn and Italian Buckthorn (garden escapee). The proximity to agriculture brings with it, weedy grasses. The threat rating remains medium.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage where there is an active beach/dune connection.	Active management of dunes to slow recession and consider possible retreat buffer zones to allow for transgressive movement of sand in response to sea level rise.	
2070: +c.80cm	Dune instability and movement further increased; Beaches below cliffs reduced or lost by sand removal to nearshore; Increase in cliff erosion.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement.	
<b>Warmer average conditions:</b> 2030: +0.3 to .6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary
<b>Drier average conditions:</b>	Dune habitats adapt well to drier conditions, but	Active dune management, including weed control;	Ensure that coastal vegetation blocks



Cell Descriptions – EP 44 Mount Drummond

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2030: -2% to 5% 2070: -10% to 20%	recover more slowly from fire and disease; Opportunity created for more frequent weed invasion, notably of dune grasses - these large dunes subject to widespread de-stabilisation. This combination of circumstances is likely to de-stabilise the dunes, to transgress landwards.	Consider possible retreat buffer zones to allow for transgressive movement of dunes in response to sea level rise. Potential re-zoning of land use and development plans.	are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	NA		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes; Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.73 Recommended Actions and Priority for EP44 Mount Drummond**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in beaches, dunes and cliff-top dunes.	Create a baseline for monitoring shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board

## Cell Descriptions – EP 44 Mount Drummond

Component	Issue	Proposed Action	Priority of Action	Key Players
	Inadequate data on biodiversity and habitat values including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons/threat)	DEW, EP Landscape Board
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, DC Lower Eyre Peninsula, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes and cats. Undertake a control program as required.	Medium (cons/threat)	EP Landscape Board, DC Lower Eyre Peninsula, landowners
	Areas within cell identified as being important habitat for threatened shorebirds, including focal species for this report with potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Monitor habitats for these species in order to manage adaptively. Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to sensitive areas eg. Access control, restrict stock access, track management, restrict vehicles on beaches, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection.	High (cons/threat)	DEW, EP Landscape Board, Birdlife Australia, Tourism SA DC Lower Eyre Peninsula, community
	Manage stock access to these areas and manage threats such as environmental weeds.	Work with private landowners to ensure that stock are restricted from the unallotted Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are	High (cons/threat)	EP Landscape Board, DEW, landowners

## Cell Descriptions – EP 44 Mount Drummond

Component	Issue	Proposed Action	Priority of Action	Key Players
		adequate and maintained and manage threats such as environmental weeds.		
	Informal and formal camping with impact from multiple tracks, soil compaction and soil erosion, vegetation damage and trampling and removal, fauna disturbance, increased fire risk, firewood collection and weed introduction.	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/infrastructure. Install and/or maintain signage.	Medium (cons/threat)	EP Landscape Board, DEW, DC Lower Eyre Peninsula, SA Tourism, community, landowners.
Dunes	Large proportion of exotic plants, and the presence of dangerous weeds (e.g. African Boxthorn and Italian Buckthorn) in part of the dunes present a current and long-term threat to the whole sand mass, which contains areas of high value habitat.	Develop and implement a weed eradication plan for the entire area of dunes, including the Heritage Agreement areas.	High (cons/threat)	EP Landscape Board, DEW, landowners
	Specific areas within the dunes are threatened by ORV activity (e.g. Picnic Beach, and the extreme south of the cell).	Review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain.  Upgrade any tracks that are not well defined or are causing water runoff or erosion. Install directional/educational signage. Community education.	Medium (cons/threat)	EP Landscape Board, DC Lower Eyre Peninsula, DEW
	As sea level rise accelerates, dunes with beach connection are increasingly affected by storm foredune damage, blowout development and	Active dune management to reduce instability and weed invasion.	Medium (cons/threat)	DEW EP Landscape Board, DC Lower Eyre Peninsula, community groups.

## Cell Descriptions – EP 44 Mount Drummond

Component	Issue	Proposed Action	Priority of Action	Key Players
	weed invasion, leading to dune recession. Increasing aridity encourages grassy weed invasion of all dunes.			
Back barrier lowlands	Rising sea level increases saline groundwater pressure.	Monitor ground water for salinity levels to manage plant and soil assets.	Medium (cons/threat)	DEW, EP Landscape Board
Heritage Agreements	Maintain integrity of remnant vegetation areas and fauna within Vegetation Heritage Agreements.	DEW to continue to support Vegetation Heritage Agreement landowners on coastal land to improve management and protection of high conservation areas and mitigate threats.	Medium (cons/threat)	DEW, EP Landscape Board, landowners

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	1081.91 ha (56.59% of the cell)
<b># flora surveys / records</b>	3 (7*) surveys, 3 (0*) opportune sites, 3 (3*) Herbarium records
<b># flora in cell</b>	101 (97*)
<b># conservation rated flora in cell</b>	0 (*0)
<b># non-indigenous flora in cell</b>	36 (34*)
<b>Significant CDCS floristic community</b>	<i>Atriplex cinerea</i> shrubland – 60% of SA records in EP <i>Leucophyta brownie</i> shrubland – 56% of SA records in EP <i>Olearia axillaris</i> / <i>Tetragonia implexicoma</i> shrubland – 76% of SA records in EP
<b>Protected area</b>	53.60% of vegetation in the cell is protected.

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Arenaria leptoclados</i>	Lesser Thyme-leaved Sandwort		0
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	Bridal Creeper	D, RA	9
<i>Avellinia michelii</i>	Avellinia		0
<i>Avena barbata</i>	Bearded Oat		2
<i>Bellardia latifolia</i>	Red Bartsia		-
<i>Bromus diandrus</i>	Great Brome		2
<i>Bromus rubens</i>	Red Brome		2

Cell Descriptions – EP 44 Mount Drummond

Species	Common Name	Status	Study rating
<i>Bupleurum semicompositum</i>	Hare's Ear		0
<i>Cakile maritima</i> ssp. <i>maritima</i>	Two-horned Sea Rocket		1
<i>Carduus tenuiflorus</i>	Slender Thistle	D	2
<i>Catapodium rigidum</i>	Rigid Fescue		1
<i>Cerastium balearicum</i>	Chickweed		1
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3
<i>Ehrharta longiflora</i>	Annual Veldt Grass		3
<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill		0
<i>Euphorbia paralias</i>	Sea Spurge	RA	5
<i>Galium murale</i>	Small Bedstraw		0
<i>Hordeum glaucum</i>	Blue Barley-grass		1
<i>Hornungia procumbens</i>	Oval Purse		0
<i>Hypochaeris glabra</i>	Smooth Cat's Ear		2
<i>Hypochaeris radicata</i>	Rough Cat's Ear		2
<i>Isolepis marginata</i>	Little Club-rush		0
<i>Lagurus ovatus</i>	Hare's Tail Grass		2
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		(2)
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Medicago truncatula</i>	Barrel Medic		1
<i>Melilotus indicus</i>	King Island Melilot		1
<i>Minuartia mediterranea</i>	Slender Sandwort		0
<i>Moraea setifolia</i>	Thread Iris		0
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Sagina maritima</i>	Sea Pearlwort		Unassigned
<i>Sonchus oleraceus</i>	Common Sow-thistle		0
<i>Stellaria media</i>	Chickweed		0
<i>Vulpia myuros</i> f. <i>myuros</i>	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed  
 Blue = recorded in 2019, new since 2011

**Native flora**

Species	Common Name	Aus status	SA status
<i>Acacia cupularis</i>	Cup Wattle		
<i>Acacia longifolia</i> ssp. <i>sophorae</i>	Coastal Wattle		
<i>Acacia nematophylla</i>	Coast Wallowa		
<i>Acrotriche patula</i>	Prickly Ground-berry		
<i>Actites megalocarpus</i>	Coast Sow-thistle		
<i>Adriana quadripartita</i>	Coast Bitter-bush		
<i>Allocasuarina verticillata</i>	Drooping Sheoak		
<i>Apium annuum</i>	Annual Celery		
<i>Atriplex cinerea</i>	Coast Saltbush		
<i>Austrostipa flavescens</i>	Coast Spear-grass		

Cell Descriptions – EP 44 Mount Drummond

Species	Common Name	Aus status	SA status
<i>Caladenia latifolia</i>	Pink Caladenia		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Carpobrotus rossii</i> (NC)	Native Pigface		
<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel		
<i>Clematis microphylla</i> var. <i>microphylla</i> (NC)	Old Man's Beard		
<i>Correa pulchella</i>	Salmon Correa		
<i>Crassula colligata</i> ssp. <i>lamprosperma</i>			
<i>Crassula colorata</i> var. <i>colorata</i>	Dense Crassula		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>	Coastal White Mallee		
<i>Eucalyptus oleosa</i> ssp.			
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Exocarpos yrticola</i>	Coast Cherry		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Geranium</i> sp.	Geranium		
<i>Gnaphalium indutum</i> ssp. <i>indutum</i>	Tiny Cudweed		
<i>Hydrocotyle capillaris</i>	Thread Pennywort		
<i>Lasiopetalum discolor</i>	Coast Velvet-bush		
<i>Lawrenzia squamata</i>	Thorny Lawrenzia		
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge		
<i>Leucophyta brownii</i>	Coast Cushion Bush		
<i>Leucopogon parviflorus</i>	Coast Beard-heath		
<i>Lichen</i> sp.			
<i>Melaleuca balmaturorum</i>	Swamp Paper-bark		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Mitrasacme paradoxa</i> (NC)	Wiry Mitrewort		
<i>Moss</i> sp.			
<i>Myosotis australis</i>	Austral Forget-me-not		
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Oxalis perennans</i> (NC)	Native Sorrel		
<i>Parietaria australis</i>	Smooth-nettle		
<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle		
<i>Parietaria debilis</i> (NC)	Smooth-nettle		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podotrochea angustifolia</i>	Sticky Long-heads		
<i>Ranunculus sessiliflorus</i> var. <i>sessiliflorus</i>	Annual Buttercup		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Roepora billardierei</i>	Coast Twinleaf		
<i>Rytidosperma setaceum</i>	Small-flower Wallaby-grass		
<i>Salsola australis</i>	Buckbush		
<i>Sclerolaena uniflora</i>	Small-spine Bindyi		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Spinifex hirsutus</i> (NC)	Rolling Spinifex		
<i>Templetonia retusa</i>	Cockies Tongue		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		

## Cell Descriptions – EP 44 Mount Drummond

Species	Common Name	Aus status	SA status
<i>Triglochin centrocarpum</i> (NC)	Dwarf Arrowgrass		
<i>Vittadinia australasica</i> var. <i>australasica</i>	Sticky New Holland Daisy		
<i>Zygophyllum billardierei</i> (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	37 (4*) recorded – 37 (4*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 23 reptiles and 24 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 16 (2*) opportune sites
<b># of threatened fauna in cell</b>	8 (0*)
<b># of non-indigenous fauna</b>	1 (0*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Blue = recorded in 2019, new since 2011

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Anthochaera carunculata</i>	Red Wattlebird		
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Calidris alba</i>	Sanderling		R
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius bicinctus</i>	Double-banded Plover		
<i>Charadrius leschenaultii</i>	Greater Sand Plover	V	R
<i>Charadrius mongolus</i>	Lesser Sand Plover	E	R
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Circus assimilis</i>	Spotted Harrier		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus coronoides</i>	Australian Raven		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Elanus axillaris</i>	Black-shouldered Kite		

## Cell Descriptions – EP 44 Mount Drummond

Species	Common Name	Aus status	SA status
<i>Eolophus roseicapilla</i>	Galah		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Gavialis vireescens</i>	Singing Honeyeater		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Pachycephala pectoralis</i>	Golden Whistler		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucobryis</i>	Willie Wagtail		
<i>Sericornis frontalis</i>	White-browed Scrubwren		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	V	V
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue= recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acaosta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinesthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.



## Cell Descriptions – EP 44 Mount Drummond

### **Mammals**

No mammal records for 2011 or 2019.

### **Reptiles**

No reptile records for 2011 or 2019.

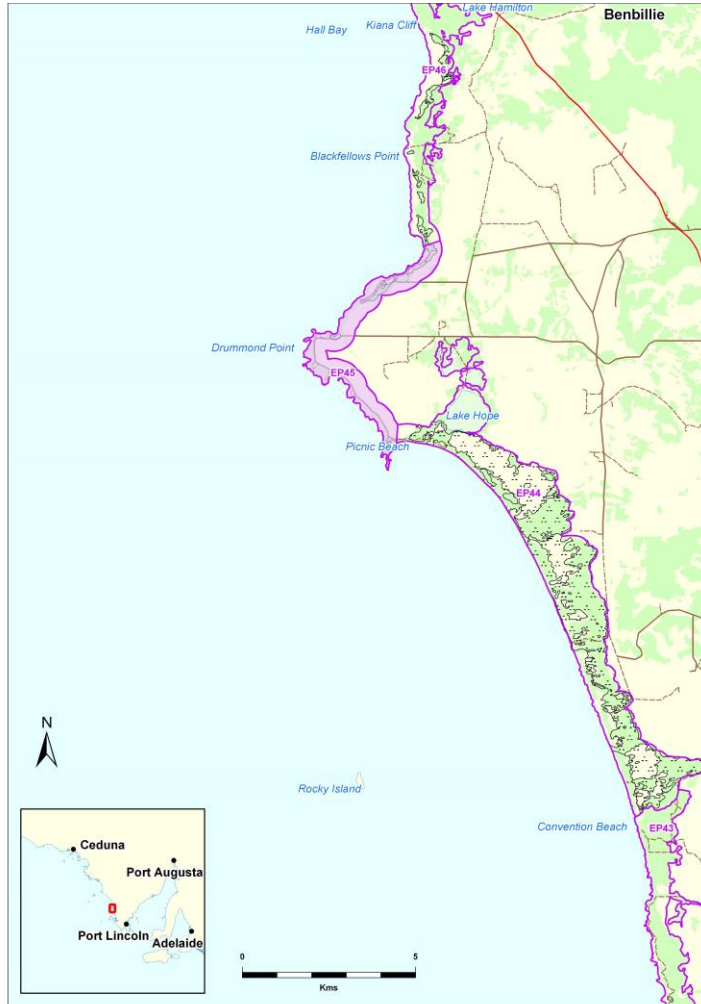
### **Amphibians**

No amphibian records for 2011 or 2019.

## Cell Descriptions – EP 45 Point Drummond

### Cell EP 45 Point Drummond

Cell area 14,105 ha. Shoreline length 14.1 km.



#### Landforms

This is an undulating coastal plain, with low, medium and high cliffs of Pleistocene calcarenite over granite and gneiss basement; the basement is exposed in platforms and reefs. Elevation and exposure of the resistant basement appears to control the alignment of the coast in this cell, as is visibly evidenced by Drummond Point and, negatively, by the shallow embayment in the north of the cell. Clifftop dunes <600m wide are found in the northern part of the cell; these have in part been de-stabilised near the low cliff edge. Elsewhere dunes are low to absent, forming a relatively narrow corridor between the cliff edge and cleared land; these areas are stabilised by coastal shrub and grasses. Wave energy is moderate. Beaches are small and are at sheltered points along the shoreline; they have steep beachface slopes, and are composed of coarse silica rich sands, with heavy minerals.

#### Benthic Habitat

National benthic mapping layer has this mapped as granite reef.

#### Biota

Remnant vegetation covers an area of 154 ha, 32% of the cell. There is one flora survey site, one opportune flora survey site, three herbarium record sites and four opportune fauna survey sites within this cell. Point Drummond is mapped as entirely emergent +/- *Acacia* sp. *Winged* (C.R. Alcock 4936) over *Lasiopetalum discolor*, *Pimelea serpyllifolia* ssp. *serpyllifolia*, *Pultenaea tenuifolia*, *Veronica billebrandii*, +/- *Gabnia densa* low open shrubland. This extends north until just south of the Hall Bay Road a small area of *Eucalyptus diversifolia* ssp. *diversifolia* mid mallee woodland over Melaleuca tall shrubs; then *Gabnia lanigera*, *Austrodanthonia caespitosa*, *Avena barbata*, *Bromus rubens*, *Goodenia willisiana* low sparse sedgeland.

#### Land Use/Land Ownership

Traditional lands of the Naou people.

## Cell Descriptions – EP 45 Point Drummond

North of Point Drummond the uncleared land is unalienated Crown land; Point Drummond is Crown land Act Reserve.

A portion of the cell adjoins Investigator Marine Park.



**FIGURE 6.78 Point Drummond, looking north towards Kiana Cliffs. A calcarenite plateau with high cliffs, tiny high tide pocket beaches, basement granitic shore platforms and nearshore reefs. Photo: Coast Protection Board, 2018**

### Uses (Field visits and local reports)

Conservation – Coastal Crown land.

Agriculture – Cropping, grazing.

Commercial fishing - Abalone, crayfish.

Recreation & Tourism – Sightseeing, nature, swimming, surfing, snorkelling, recreational fishing, camping (informal), horse riding, dog walking, ORV use (four-wheel drive - northern section of Cell), boating.

Boat launching – Beach.

### Values (Field visits and local reports)

Conservation – Important habitat for threatened flora (West Coast Mint Bush) and threatened fauna (Eastern Osprey).

### Threats (Field visits and local reports)

Agriculture – Grazing – most vegetation areas in this Cell have stock excluded.

Pollution – Marine debris.

Uncontrolled access – ORV use (northern section of Cell), informal camping leading to track creation, vegetation destruction, dune erosion.

## Cell Descriptions – EP 45 Point Drummond

Feral animals – Cats, rabbits, foxes.

Weed infestation - African Boxthorn, Italian Buckthorn (garden escapees).

### Opportunities

Opportunities for coastal management plans to be implemented by DEW in collaboration with NRM Landscape Board, private landowners, with particular emphasis on pest plant and animal control and access control.

Build on existing weed control program by DEW and private landowners to control African Boxthorn and Italian Buckthorn and improve protection of West Coast Mintbush population.

### Conservation Analysis (GIS)

The total of conservation means, 75.7, is low for the region. The combined detailed conservation layers map shows totals are low on the cleared land, low medium along the cliffs, and medium in the vegetated dunes and sedgeland. The major contributors to priority are: floristic communities rarity and endemism (both generalised to the whole cell); threatened species status; habitat for threatened mammals; viewscape and viewshed; registered indigenous heritage sites. Other layers making minor contributions, include: total number of threatened species (mallee gum area); species richness; habitat of threatened bird species (cliffs and mallee); habitat of reptile species, mammal species and butterfly species; and vegetation block metrics. The Kiana Granite of Point Drummond (western headland) is a Geological Monument. The distribution of butterfly habitat is distinctive: the *Gabnia* sedgelands show as high-medium and there are a high number of butterfly species (Black & white sedge skipper, Blotched dusky blue, Caper white, Common grass-blue, *Donnysa* sedge-skipper, Fringed heath-blue, Meadow Argus, Salt bush blue, Sciron sedge-skipper, Western dusky-blue, Two spotted line-blue), other vegetated cliff tops map as medium.

The 2019 review showed three new native flora species records and one additional weed species record since the 2011 analysis with 47 flora species records by the 2019 review. Five flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). One of the new flora records includes species with a conservation rating West Coast Mintbush, *Prostanthera calycina*, listed as Vulnerable under the *National Parks and Wildlife Act 1972* (NPW Act) and Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

The 2019 review showed two additional native fauna species recorded since the 2011 analysis, bringing the total number of fauna species records to three by 2019 compared with no fauna records in 2011. One of the new fauna records includes species with a conservation rating (excluding ssp) - the Osprey, *Pandion haliaetus*, listed as Endangered under the NPW Act. If the analysis were repeated for this cell, with only slight increases in flora species richness, number of threatened bird species, and habitat for focal species eg. Eastern Osprey, this would still not be enough to raise the conservation rating of the cell to Medium. The rating would remain low.

### Threat Analysis (GIS)

The total of threat means, 44.81, is medium for the region. The distribution of detailed total values is clear: the *Gabnia* sedgelands, part of the *E. diversifolia* mallee, the Crown land reserve at both the headlands of Point Drummond are high threat areas, elsewhere totals are medium. Major threats identified include: ORV activity (headlands and *Gabnia* sedgelands); development zoning, land ownership and land use (cleared land), viewshed and viewscape (almost whole cell), weeds and exotic species (high cliff tops), and cliff instability (medium high values).

## Cell Descriptions – EP 45 Point Drummond

It is likely that the area impacted by ORV and informal campsites including further track creation has increased since 2011, with reports that these activities have resulted in increased vegetation degradation and cliff-top dune erosion. There is one new weed species record identified in the 2019 data review, Bridal Creeper, *Asparagus asparagoides* f. *asparagoides* that is both a Declared and a Red Alert weed. Surveys reported known occurrences of African Boxthorn and Italian Buckthorn. The proximity to agriculture also brings with it, weedy grasses. There is also a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains medium.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession. Increase in dune mobility.	Active management of dunes.	
2070: +c.80cm	Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases		Continue to monitor shoreline movement.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage;	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.

## Cell Descriptions – EP 45 Point Drummond

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	Opportunity created for more frequent weed invasion, notably of dune grasses, and de-stabilisation of cliff-top dunes.		
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	N/A		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes.	Adaptive management of plant assets.	
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.74 Recommended Actions and Priority for EP45 Point Drummond**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Inadequate data on biodiversity and habitat values including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons/threat)	DEW, EP Landscape Board
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, cats. Undertake a control program where required.	Medium (cons/threat)	EP Landscape Board, DC Lower Eyre Peninsula, landholders

## Cell Descriptions – EP 45 Point Drummond

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important habitat for focal species for this report with potential impacts from agricultural activities, recreational activities, feral animals and land management practices.	Monitor habitats for these species in order to manage adaptively. Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to sensitive areas eg. Access control, restrict stock access, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DEW, EP Landscape Board, Birdlife Australia Tourism SA, DC Lower Eyre Peninsula, community
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, landowners, community groups, DC Lower Eyre Peninsula, EP Landscape Board, DEW, DPC
	Management of stock access in the coastal zone and manage threats such as environmental weeds.	While most vegetated areas in this Cell have stock excluded. Continue to work with private landowners to ensure that stock are restricted from the unallotted Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained and manage threats such as environmental weeds.	High (cons/threat)	EP Landscape Board, DEW, landowners
	Management of threatened plants (West Coast Mintbush).	Potential for Management Plan to protect threatened species and minimise impacts and threats.	High (cons/threat)	DEW

## Cell Descriptions – EP 45 Point Drummond

Component	Issue	Proposed Action	Priority of Action	Key Players
Headlands	<p>Informal and formal camping with impact from multiple tracks, soil compaction and soil erosion, vegetation damage and trampling and removal, vertebrate pest disturbance, increased fire risk, firewood collection and weed introduction.</p>	<p>Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks.</p> <p>Provision of appropriate amenities. Develop weed management strategy.</p> <p>Manage and maintain facilities/ infrastructure.</p> <p>Install and/or maintain signage.</p>	<p>Medium (cons/threat)</p>	<p>EP Landscape Board, DEW, DC Lower Eyre Peninsula, SA Tourism, community, landowners</p>
Cliff-top dunes	<p>Management of informal camping. ORV use (northern section of Cell within cliff-top dunes), informal camping leading to track creation, vegetation destruction, dune erosion. Also, cliff-top dunes recover more slowly from damage with increasing aridity.</p>	<p>The dunes show medium high conservation values.</p> <p>Manage dune degradation where appropriate;</p> <p>Monitor dune movement and review impact on neighbouring lands.</p> <p>Improve connectivity to foster resilience of vegetation communities.</p> <p>Coastal management plans could be developed and implemented by DEW, with particular emphasis on pest plant and animal control and access control.</p> <p>Review with a view to rationalise unnecessary tracks and car parks. Close or reroute tracks and car parks close to cliff edge. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain.</p> <p>Formalise and maintain pedestrian access. Install directional/ educational signage where required.</p>	<p>Medium (cons/threat)</p>	<p>DEW, Tourism SA, DC Lower Eyre Peninsula, EP Landscape Board</p>



## Cell Descriptions – EP 45 Point Drummond

Component	Issue	Proposed Action	Priority of Action	Key Players
Gahnia sedgeland	As aridity increases, blowout development and weed invasion, leading to dune recession. ORV use in <i>Gahnia</i> sedgeland.	Active dune management and ORV access control as above.	Medium (cons/threat)	DEW, EP Landscape Board

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	154.17 ha (31.71% of the cell)
<b># flora surveys / records</b>	1 (2*) surveys, 1 (0*) opportune sites, 3 (3*) Herbarium records
<b># flora in cell</b>	47 (48*)
<b># conservation rated flora in cell</b>	1 (0*)
<b># non-indigenous flora in cell</b>	8 (9*)
<b>Significant CDCS floristic community</b>	<i>Gahnia lanigera</i> / <i>Lepidosperma congestum</i> sedgeland – 11% of SA records in EP <i>Olearia axillaris</i> / <i>Lasiopetalum discolor</i> shrubland – 52% of SA records in EP
<b>Protected area</b>	None of the flora in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	Bridal Creeper	D, RA	9
<i>Catapodium rigidum</i>	Rigid Fescue		1
<i>Lysimachia arvensis</i>	Pimpernel		2
<i>Medicago truncatula</i>	Barrel Medic		1
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Poa bulbosa</i>	Bulbous Meadow-grass		0
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Silene nocturna</i>	Mediterranean Catchfly		1

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

#### Native flora

Species	Common Name	Aus status	SA status
<i>Acrotriche patula</i>	Prickly Ground-berry		

## Cell Descriptions – EP 45 Point Drummond

Species	Common Name	Aus status	SA status
<i>Austrostipa acroclitata</i>	Graceful Spear-grass		
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Cassytha glabella</i> f. <i>dispar</i>	Slender Dodder-laurel		
<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel		
<i>Clematis microphylla</i> var. <i>microphylla</i> (NC)	Old Man's Beard		
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>	Coastal White Mallee		
<i>Eucalyptus yalata</i> ssp. <i>yalata</i>	Yalata Mallee		
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Exocarpos syrticola</i>	Coast Cherry		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Gabnia lanigera</i>	Black Grass Saw-sedge		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Helichrysum leucopsidium</i>	Satin Everlasting		
<i>Hibbertia platyphylla</i> ssp. <i>platyphylla</i>			
<i>Lasiopetalum discolor</i>	Coast Velvet-bush		
<i>Leucophyta brownii</i>	Coast Cushion Bush		
<i>Leucopogon parviflorus</i>	Coast Beard-heath		
<i>Lomandra collina</i>	Sand Mat-rush		
<i>Lomandra effusa</i>	Scented Mat-rush		
<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	Mallee Honey-myrtle		
<i>Microtis arenaria</i>	Notched Onion-orchid		
<i>Minuria leptophylla</i>	Minnie Daisy		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Oxalis perennans</i>	Native Sorrel		
<i>Pimelea flava</i> ssp. <i>dichotoma</i>	Diosma Riceflower		
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme Riceflower		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podotroche angustifolia</i>	Sticky Long-heads		
<i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i>	Mallee Pomaderris		
<i>Prostanthera calycina</i>	West Coast Mintbush	VU	V
<i>Pultenaea tenuifolia</i>	Narrow-leaf Bush-pea		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Samolus repens</i>	Creeping Brookweed		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Thryptomene micrantha</i>	Ribbed Thryptomene		
<i>Thysanotus baueri</i>	Mallee Fringe-lily		
<i>Tricoryne tenella</i>	Tufted Yellow Rush-lily		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	3 (1*) recorded – 2 (1*) birds, 0 (0*) reptile, 0 (0*) butterflies, 1 (0*) mammals, 0 (0*) amphibian (an additional 22 reptiles and 24 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 4 (3*) opportune sites
<b># of threatened fauna in cell</b>	3 (0*)
<b># of non-indigenous fauna</b>	0 (0*)

## Cell Descriptions – EP 45 Point Drummond

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

No non-indigenous fauna recorded in 2019.

Species	Common Name	Class	Record
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Calidris alba</i>	Sanderling		R
<i>Pandion haliaetus</i>	Osprey		E

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

## Cell Descriptions – EP 45 Point Drummond

### Mammals

Species	Common Name	Aus status	SA status
<i>Mirounga leonina</i>	Southern Elephant Seal	V	R

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Reptiles

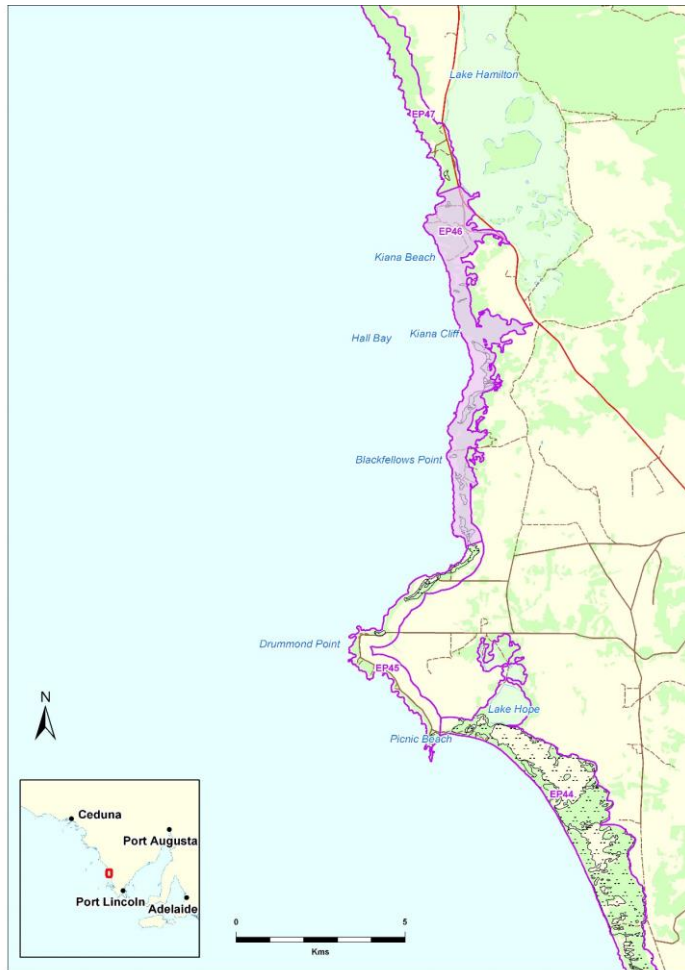
No reptile species recorded in 2011 or 2019.

### Amphibians

No amphibian species recorded in 2011 or 2019.

### Cell EP 46 Kiana Cliffs

Cell area 893 ha. Shoreline length 13.7 km.



#### Landforms

The coast is mainly cliffs, with many indentations, but aligned overall North – South, and with only small pocket beaches. Kiana Beach in the north is the exception with 2 km of fine-medium sand, reflective, beach, backed by low to medium cliffs. The cliffs are of Pleistocene calcarenite over Sleaford Complex gneiss and granite, sporadically visible in reefs and platforms. Wave energy is high along the exposed coast, and talus and other cliff collapse features show that erosion of the Pleistocene barrier materials is active. White Holocene clifftop dunes have been partly destabilised and driven short distance inland from the cliffs; the inner parts of these dunes are frequently well vegetated.

#### Benthic Habitat

Almost entirely heavy limestone reef (granite reef at the extreme S and N ends).

#### Biota

There is 680 ha of remnant vegetation, 76% of the cell. The cell boundary has largely been determined by the extent of coastal vegetation. There are three flora survey sites, one opportune flora site and one herbarium record site. In the north part centre of the cell emergent +/- *Acacia* sp. *Winged* (C.R.Alcock 4936) over *Lasiopetalum discolor*, *Pimelea serpyllifolia* ssp. *serpyllifolia*, *Pultenaea tenuifolia*, *Veronica hillebrandii*, +/- *Gabnia deusta* low open shrubland is found. Elsewhere, *Eucalyptus diversifolia* ssp. *diversifolia* mid mallee woodland over +/- *Melaleuca lanceolata*, +/- *Melaleuca uncinata* tall shrubs over *Acrotriche patula*, +/- *Lasiopetalum discolor* low shrubs are found on the vegetated clifftop dunes and thin limestone soils.

#### Land Use/Land Ownership

Traditional lands of the Naou people.

Cell adjoins Investigator Marine Park.

100% of this cell is not protected, however a number of private landowners do their best to limit threats to the environmental values. The boundary of the unalienated Crown land is 200-400 m wide.



**FIGURE 6.79 Kiana Cliffs. Calcarenite cliffs and reefs; active cliff collapse; cliff-top dunes; Lake Hamilton in background. Photo: Coast Protection Board, 2018.**

Uses (Field visits and local reports)

Conservation – Crown land reserves.

Agriculture – Grazing (only in small portions of cell).

Recreation & Tourism – Surfing, recreational fishing, camping (informal - northern end of cell), dog walking, ORV use (four-wheel drive - minimal impact northern end of cell).

Values (Field visits and local reports)

Conservation – important habitat for threatened fauna on small pocket beaches (Hooded Plover).

Threats (Field visits and local reports)

Agriculture – Grazing (limited).

Pollution – Marine debris.

Uncontrolled access – ORV use, informal camping leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds (Kiana Beach) - northern end of cell.

Feral animals – Cats, rabbits, foxes.

Weed infestation - African Boxthorn, Italian Buckthorn (garden escapees).

Opportunities (Field visits and local reports)

Opportunity for coastal management plans to be developed and implemented by DEW, EP Landscape Board and private landowners, with particular emphasis on pest plant and animal control and access control.



## Cell Descriptions – EP 46 Kiana Cliffs

Monitoring - continue Hooded Plover Biennial count monitoring. Opportunity to increase territory monitoring during the Hooded Plover nesting season to determine importance of this site for nesting pairs.

### Conservation Analysis (GIS)

The total of conservation priority means is 93.87, a medium score for the region. High to medium values are found on the vegetated inner dune towards the southern end of Kiana Cliffs (mallee woodland over shrubland); medium low values are widespread with very totals on the de-vegetated clifftops. The major contributing layers to this priority include rarity of plant species (throughout the cell), threatened status of fauna (a complex but widespread pattern of values), endemic status of plant associations (widespread, but higher priority in the mallee woodland), number of threatened bird species (mallee woodland), butterfly habitat (all vegetated areas), viewscape (high along the spectacular cliffs), and vegetation metrics. Further priority is added from total number of threatened species, species richness, number of reptile and mammal species, habitat of threatened mammals, habitat for focal species Easter Osprey and White-bellied Sea Eagle, and viewshed.

The 2019 review showed seven new native flora species records and four additional weed species records since the 2011 analysis, with 91 flora species records in the 2019 review compared with 98 in 2011. 18 flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable).

The 2019 review showed no new additional native fauna species records since the 2011 analysis. The total number of fauna species remains at zero. The rating would remain medium.

### Threat Analysis (GIS)

The total of threat means 39.555 is a medium score for the region. The detailed pattern of total threats is complex, varying from very high to very low; in general, threats increase away from the cliffs, though is not a consistent pattern. The main threats include land ownership, viewscape, and vegetation block degradation (% of exotic species). Other lesser threats include ORV activity, development zoning, viewshed, land use, mining tenements, vegetation block shape and the distribution of dangerous weeds; also dune and cliff instability as well as informal camping and parking contribute. However, no individual threat shows a very high score. There are concentrations of ORV and camping pressure at the headland north of Kiana Beach and the north end of Kiana Beach; also in the extreme south of the cell.

Current reports of the impact of ORV and informal camping leading to further track creation, vegetation destruction, dune erosion, disturbance of shorebirds focusing around Kiana Beach to the northern end of cell. The proximity to agriculture also brings with it, weedy grasses. There are four new weed species records identified in the 2019 data review, Onion Weed, *Asphodelus fistulosus*, Oat, *Avena sp.*, Common Evening Primrose, *Oenothera stricta ssp. stricta* and Sea Pearlwort, *Sagina maritima*, but none that are Declared or Red Alert species. Surveys have reported known occurrences of African Boxthorn and Italian Buckthorn, but these are not reflected in the weed species records. There is also a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains medium.

### Possible Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on

## Cell Descriptions – EP 46 Kiana Cliffs

flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility.	Active management of dunes; Consider possible retreat buffer zones for clifftop dunes - re-zoning on land use and development plans needed.	
2070: +c.80cm.	Dune instability and movement further increased; Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses, and destabilisation of clifftop dunes.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.



## Cell Descriptions – EP 46 Kiana Cliffs

Climate change element/scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	NA		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes; Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in back barrier lowlands behind the clifftop dunes.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.75 Recommended Actions and Priority for EP46 Kiana Cliffs**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	The high energy conditions and the soft limestone rock combine to result in cliff instability; this will increase with sea level rise.	Monitor cliff erosion and undertake adaptive management as required eg Close or reroute tracks or any car parks close to cliff edge. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain.	Medium (cons/threat)	DEW

## Cell Descriptions – EP 46 Kiana Cliffs

Component	Issue	Proposed Action	Priority of Action	Key Players
	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	EP Landscape Board, Council, community
	Very inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons, threat)	DEW, EP Landscape Board
	Reducing stock access to the coastal zone.	Grazing impacts are limited. Continue to work with private landowners to ensure that stock are restricted from the unalienated Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	Medium (cons/threat)	landowners, DEW, EP Landscape Board
	Unalienated Crown land and adjacent private property threatened by ORV activity (only minimum activity in the northern part of the cell) and weed infestations (African Boxthorn and Italian Buckthorn).	Active dune management and ORV access control as above and manage threats such as environmental weeds.	Medium (Cons/threat)	DEW, Tourism SA, DC Lower Eyre Peninsula, EP Landscape Board
	Management of interactions with threatened shorebirds at Kiana beach.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season; improve management of	High (cons/threat)	DEW, EP Landscape Board, Birds Australia DC Lower Eyre, community

## Cell Descriptions – EP 46 Kiana Cliffs

Component	Issue	Proposed Action	Priority of Action	Key Players
		<p>nesting site(s) on pocket beaches, access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations.</p> <p>Review development plan zoning to these areas to increase protection.</p> <p>Community education programs.</p> <p>Install interpretive/ educational signage.</p>		
Clifftop dunes	Increasing aridity encourages grassy weed invasion of all dunes, including cliff top dunes.	<p>Active dune management. Improve connectivity to foster resilience of vegetation communities. Coastal management plans could be developed and implemented by DEW, with particular emphasis on pest plant and animal control and access control. Undertake a sequenced plan of weed control to improve the resilience of the conservation assets of this cell.</p>	Medium (cons/threat)	DEW, EP Landscape Board
	<p>Some ORV activity including tracks/car parks close to potentially unstable cliff edge - Safety hazard;</p> <p>Impact on the coastal dune and cliff top vegetation, soil compaction and erosion;</p> <p>Weed introduction;</p> <p>Disturbance to native fauna species;</p> <p>Water runoff erosion. Also, clifftop dunes recover more slowly from damage with increasing aridity.</p>	<p>The dunes show medium high conservation values. Manage dune degradation where appropriate;</p> <p>Monitor dune movement and review impact on neighbouring lands.</p> <p>Improve connectivity to foster resilience of vegetation communities.</p> <p>Review with a view to rationalise unnecessary tracks and car parks. Close or reroute tracks and car parks close to cliff edge. Block access (eg. fencing/rocks) to tracks and car parks to be closed,</p>	High (cons/threat)	DEW, Tourism SA, DC Lower Eyre Peninsula, EP Landscape Board

## Cell Descriptions – EP 46 Kiana Cliffs

Component	Issue	Proposed Action	Priority of Action	Key Players
		rehabilitate (where appropriate) and maintain. Formalise and maintain pedestrian access. Install directional/ educational signage where required.		
	Rising sea level increases saline groundwater pressure.	Monitor ground water for salinity levels to manage plant and soil assets.	Medium (cons/threat)	DEW

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	679.56 HA (76.12% of the cell)
<b># flora surveys / records</b>	3 (5*) surveys, 1 (0*) opportune sites, 1 (1*) Herbarium records
<b># flora in cell</b>	91 (98*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	25 (31*)
<b>Significant CDCS floristic community</b>	<i>Triodia compacta</i> hummock grassland – 100% of SA records are in EP <i>Eucalyptus diversifolia</i> / <i>Clematis microphylla</i> mallee – 81% of SA records are in EP <i>Olearia axillaris</i> / <i>Lasiopetalum discolour</i> shrubland – 52% of SA records are in EP
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	Bridal Creeper	D	9
<i>Aspodelus fistulosus</i>	Onion Weed		3
<i>Avellinia michelii</i>	Avellinia		0
<i>Avena barbata</i>	Bearded Oat		2
<i>Avena</i> sp.	Oat		-
<i>Bromus diandrus</i>	Great Brome		2
<i>Bromus rubens</i>	Red Brome		2
<i>Bupleurum semicompositum</i>	Hare's Ear		0
<i>Catapodium rigidum</i>	Rigid Fescue		1
<i>Cerastium balearicum</i>	Chickweed		1
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3

## Cell Descriptions – EP 46 Kiana Cliffs

Species	Common Name	Status	Study rating
<i>Galium murale</i>	Small Bedstraw		0
<i>Hordeum glaucum</i>	Blue Barley-grass		1
<i>Lagurus ovatus</i>	Hare's Tail Grass		2
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		-
<i>Marrubium vulgare</i>	Horehound	D, RA	5
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Oenothera stricta</i> ssp. <i>stricta</i>	Common Evening Primrose		0
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Sagina maritima</i>	Sea Pearlwort		-
<i>Senecio pterophorus</i>	African Daisy		2
<i>Silene nocturna</i>	Mediterranean Catchfly		1
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia anceps</i> (NC)	Angled Wattle		
<i>Acacia cyclops</i>	Western Coastal Wattle		
<i>Acacia longifolia</i> ssp. <i>sophorae</i>	Coastal Wattle		
<i>Acrotriche patula</i>	Prickly Ground-berry		
<i>Angianthus preissianus</i>	Salt Angianthus		
<i>Apium annuum</i>	Annual Celery		
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Brachyscome lineariloba</i>	Hard-head Daisy		
<i>Brachyscome perpusilla</i>	Tiny Daisy		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Callitris</i> sp.	Native Pine		
<i>Cassytha glabella</i> f. <i>dispar</i>	Slender Dodder-laurel		
<i>Clematis microphylla</i> var. <i>microphylla</i> (NC)	Old Man's Beard		
<i>Comesperma volubile</i>	Love Creeper		
<i>Compositae</i> sp.	Daisy Family		
<i>Corybas despectans</i>	Coast Helmet-orchid		
<i>Crassula colorata</i> var. <i>acuminata</i>	Dense Crassula		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>	Coastal White Mallee		
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Exocarpos yrticola</i>	Coast Cherry		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Gabnia lanigera</i>	Black Grass Saw-sedge		

## Cell Descriptions – EP 46 Kiana Cliffs

Species	Common Name	Aus status	SA status
<i>Gnaphalium indutum</i> ssp. <i>indutum</i>	Tiny Cudweed		
<i>Gramineae</i> sp.	Grass Family		
<i>Helichrysum leucopsideum</i>	Satin Everlasting		
<i>Hibbertia virgata</i>	Twiggy Guinea-flower		
<i>Hydrocotyle capillaris</i>	Thread Pennywort		
<i>Lasiopetalum discolor</i>	Coast Velvet-bush		
<i>Lawrenca squamata</i>	Thorny Lawrenca		
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge		
<i>Leucophyta brownii</i>	Coast Cushion Bush		
<i>Leucopogon parviflorus</i>	Coast Beard-heath		
<i>Melaleuca decussata</i>	Totem-poles		
<i>Microtis arenaria</i>	Notched Onion-orchid		
<i>Millotia major</i>			
Moss sp.			
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia ramulosa</i>	Twiggy Daisy-bush		
<i>Opercularia turpis</i>	Twiggy Stinkweed		
<i>Oxalis perennans</i> (NC)	Native Sorrel		
<i>Pimelea flava</i> ssp. <i>dichotoma</i>	Diosma Riceflower		
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme Riceflower		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Poa poiiformis</i> var. <i>poiiformis</i>	Coast Tussock-grass		
<i>Podotroche angustifolia</i>	Sticky Long-heads		
<i>Pultenaea tenuifolia</i>	Narrow-leaf Bush-pea		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Rytidosperma setaceum</i>	Small-flower Wallaby-grass		
<i>Samolus repens</i>	Creeping Brookweed		
<i>Sclerolaena uniflora</i>	Small-spine Bindyi		
<i>Senecio picridioides</i>	Purple-leaf Groundsel		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Spinifex hirsutus</i> (NC)	Rolling Spinifex		
<i>Spyridium phylloides</i>	Narrow-leaf Spyridium		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Thysanotus baueri</i>	Mallee Fringe-lily		
<i>Triodia compacta</i>	Spinifex		
<i>Veronica hillebrandii</i>	Rigid Speedwell		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	0 (16*) recorded – 0 (0*) birds, 0 (0*) reptile, 0 (16*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 22 reptiles and 10 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 0 (0*) opportune sites
<b># of threatened fauna in cell</b>	0 (0*)
<b># of non-indigenous fauna</b>	0 (1*)

(#\*) Number of records present and analysed in 2011 study

## Cell Descriptions – EP 46 Kiana Cliffs

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

No bird species recorded in 2011 or 2019 data.

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	x
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	x
<i>Hesperilla donnysa diluta</i>	Donnysa Sedge-skipper		x
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	x
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	x
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Pieris rapae rapae</i>	Cabbage White	LC	x
<i>Geitoneura klugii</i>	Common Xenica	LC	x
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	x
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC	x
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamennus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Erina acaata</i>	Blotched Dusky-blue		x
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	x
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	x
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	x
<i>Theclinessthes alboincta</i>	Bitter-bush Blue		x
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	x
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	x

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammal species recorded in 2011 or 2019 data.

**Reptiles**

No reptile species recorded in 2011 or 2019 data.

**Amphibians**

No amphibian species recorded in 2011 or 2019 data.



**Cell EP 49 Loch Well Beach**

Cell area 909 ha. Shoreline length 13 km.



Landforms

This cell is an undulating plateau: composed entirely of Pleistocene calcarenite barrier materials, eroded to 30 to 80m cliffs (generally higher towards the NW). The middle of the cell this is heavily gullied and fronted by narrow fine sand beaches with wide nearshore sand bars. At the 2 ends of cell the cliffs are steep, and gullies and beaches are absent; all cliff profiles show evidence of active retreat. There is little sand storage along these cliffs: cliff top dunes are few, low, and sparse. This shore is exposed, with high wave energy throughout.

Benthic Habitat

Bare sand inshore is mapped along the entire cell.

Biota

Remnant vegetation covers an area of 721 ha, 79 % of the cell. There are two flora survey sites, two herbarium record sites, five fauna survey sites

and nine opportune fauna survey sites.

The thin sands over limestone support one association: *Leucophyta brownii*, +/- *Austrostipa stipoides* low sparse shrubland over *Frankenia pauciflora var. fruticulosa*, *Senecio pinnatifolius*, *Disphyma crassifolium ssp. clavellatum*, +/- *Samolus repens*. Two other associations are found in small remnants near the coastal boundary: a mallee woodland near Lochs Well Road, and an *Austrostipa* grassland in the south of the cell.

Land Use/ Land Ownership

Much of this cell is zoned coastal; only part of the north of the cell is zoned for primary industry. The majority of the cell (to 3km from its southern boundary) is Crown leasehold; except for a minimal 60 m coastal reserve of unalienated Crown land along the cliff tops.

Uses (Field visits and local reports)

Agriculture – Grazing.

Recreation & Tourism – Sightseeing, hiking, surfing, recreational fishing, camping (informal).

## Cell Descriptions – EP 49 Loch Well Beach

### Values (Field visits and local reports)

Conservation - Investigator Marine Park offshore.

### Threats (Field visits and local reports)

Agriculture – Grazing (some up to cliff edge).

Pollution – Rubbish dumping, marine debris.

Stormwater – Erosion.

Uncontrolled access – Informal camping.

Feral animals – Cats, rabbits, foxes.

Weed infestation - African Boxthorn.



**FIGURE 6.80 Loch Well Beach. Calcarenite coastal plateau, first order valleys, beach and nearshore bars. Photo: Coast Protection Board, 2018**

### Opportunities (Field visits and local reports)

Opportunities for coastal management plans to be developed and implemented by DEW, DC of Elliston and private landholders with particular emphasis on pest plant control to maintain the gains achieved towards African Boxthorn control (2014 - 2017) as well as reduce the amount of grazing by stock in the coastal zone.

### Conservation Analysis (GIS)

The total of conservation means, 82.97, is low for the region. Everywhere totals are low to low medium, the vegetated areas are low medium, the rest low; only a small area of clifftop dune near the southern boundary of the cell supports a medium high total. The sparse low shrubland is an endemic vegetation association and contributes strongly to the total: over 80% of the SA records of this vegetation association are found within the Eyre Peninsula region, thus approximately

## Cell Descriptions – EP 49 Loch Well Beach

75% of the cell obtains the highest priority for this layer, the highest total for this variable within the region. Moderate to high values are also widespread for species richness; widespread high values are also found for butterfly habitat, viewshed and viewscape and vegetation block metrics. Widespread low to moderate values are found for rarity and threatened status of species, medium low value for bird habitat is found along the cliffs; the sparse shrubland gives moderate but extensive, values for reptile habitat.

The 2019 review showed two new native flora species records and one additional weed species record since the 2011 analysis, with 84 flora species records by the 2019 review. Six flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable).

The 2019 review showed seven new additional native fauna species records since the 2011 analysis with 53 fauna species records by the 2019 review. Three fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). If the analysis were repeated for this cell, with only slight increases in flora species richness, the number of threatened bird species, and fauna species richness, this would still not be enough to raise the conservation rating of the cell to Medium.

The rating would remain low.

### Threat Analysis (GIS)

The total of threat means is 48.859, high for the region. The detailed map of totals medium high to high totals almost everywhere through the cell; cliff tops and an inland area NW of Lochs Well Beach (primary industry zone) give the highest threat totals. Contributors to this threat total include development zoning, land ownership, viewshed and viewscape, land use (very high), prevalence of exotic vegetation species, presence of dangerous weeds, and cliff instability. ORV activity is insignificant in this cell. The high endemicy shrubland is especially threatened by ownership and weeds.

Current reports of the increased impact of ORV and informal camping leading to further track creation, vegetation destruction and cliff erosion. The proximity to agriculture and grazing to the edge of cliff tops in some areas, exacerbates cliff erosion, vegetation degradation and spread of weeds. There was only one new weed species record identified in the 2019 data review, Pimpernel, *Lysimachia arvensis*, which is neither a Declared or Red Alert species. There is also a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains High.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a	

## Cell Descriptions – EP 49 Loch Well Beach

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>throughout this cell</b>		rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Rising sea level will accelerate existing rapid cliff erosion.	Maintain record of change.	
2070: +c.80cm	Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; damage to cliffs.		
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses, and de-stabilisation of clifftop dunes.	Active management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Increased flash runoff down first order valleys.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure; Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in more low-lying locations.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b>	Persistent swell wave climate maintains sediment movement.		

## Cell Descriptions – EP 49 Loch Well Beach

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C			

**TABLE 6.76 Recommended Actions and Priority for EP49 Loch Well Beach**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing climate change will impact vegetation associations in this cell; Current active cliff erosion will increase with sea level rise.	Create a baseline for monitoring vegetation and cliff change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board
	Calcarenite cliff erosion accelerates as sea level rises.	Undertake annual inspection of potentially hazardous cliff top sites.	High (potential hazard)	DC of Elliston, DEW
	The low, sparse shrubland contains significant values for endemic vegetation associations, bird, reptile and butterfly habitat - This is threatened by African Boxthorn and is likely to be threatened by increasing aridity.	The coastal zoning and crown leasehold status of much of this land may offer the possibility of establishing a management regime to conserve this shrubland.	High (cons/threat)	EP Landscape Board, landowners, DEW
	Management of stock in the coastal zone. Grazing up to cliff edge in some areas. Stock access can damage vegetation, exacerbate erosion and be a vector for pest plants.	Continue to work with private landowners to ensure that stock are restricted from the unallotted Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	High (cons/threat)	EP Landscape Board, landowners, DEW.

## Cell Descriptions – EP 49 Loch Well Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, DC of Elliston
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons/threat)	DEW, EP Landscape Board
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Medium (cons/threat)	EP Landscape Board, DC of Elliston, private landowners, DEW
	Weed species identified throughout cell including Declared weeds - African Boxthorn Lincoln Weed.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/threat)	EP Landscape Board, private landowners, DC of Elliston, DEW
	Areas of unrestricted access, multiple vehicle tracks and informal car parks around the coast, some of these are close to potentially unstable cliff edges, impacting on the coastal dune and cliff top vegetation, safety hazard, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species.	Develop access/traffic management plan – including review of existing tracks and car parks with a view to rationalise. Close or reroute tracks and car parks that are too close to cliff edge. Block access (eg. fencing/rocks) to tracks and/or car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks and/or car parks that are not well defined, or are causing water run-off erosion, design to minimise impact to clifftop dunes and	High (hazard; cons/ threat)	DC of Elliston, DPTI, DEW, EP Landscape Board, private landowners, Tourism SA, community

## Cell Descriptions – EP 49 Loch Well Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
		vegetation. Provide and maintain formalised pedestrian access from car parks. Install directional /educational signage. Community education.		
	ORV activity and informal camping is applying strong pressure on the coastal reserves.	Rationalise tracks and camping points through consultation and local access control. Coastal management plans prepared and implemented with particular emphasis on foreshore rehabilitation, revegetation, pest plant and animal control, access control, and stormwater management.	High (Cons/ threat)	DEW Tourism SA DC Streaky Bay EP Landscape Board community
	Narrow beaches and cliffs recede as sea level rises; cliff instability increases. Also, the few areas where there are clifftop dunes will recover more slowly from damage with increasing aridity.	Monitor dune habitat conditions, with a view to review of management strategy.	Medium (cons/threat)	DEW, EP Landscape Board, DC of Elliston, community
	Vehicles and dogs on beaches a threat to meiofauna and shorebirds.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DC of Elliston, EP Landscape Board, DPTI, EP LGA, DEW, Tourism SA, Birds Australia, community



## Cell Descriptions – EP 49 Loch Well Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
	Maintenance of coastal access management infrastructure.	Use the EP Coastal infrastructure audit to setup a maintenance program.	Medium (potential public hazard)	DEW, DC Elliston, EP Landscape Board, community groups

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	720.51 ha (79.22% of the cell)
<b># flora surveys / records</b>	2 (3*) surveys, 0 (0*) opportune sites, 2 (2*) Herbarium records
<b># flora in cell</b>	84 (87*)
<b># conservation rated flora in cell</b>	1 (1*)
<b># non-indigenous flora in cell</b>	28 (30*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Avena barbata</i>	Bearded Oat		2
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus diandrus</i>	Great Brome		2
<i>Bromus madritensis</i>	Compact Brome		2
<i>Bromus rubens</i>	Red Brome		2
<i>Bupleurum semicompositum</i>	Hare's Ear		0
<i>Cassytha glabella</i> f. <i>glabella</i>	Slender Dodder-laurel		0
<i>Catapodium rigidum</i>	Rigid Fescue		1
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3
<i>Galium murale</i>	Small Bedstraw		0
<i>Hordeum glaucum</i>	Blue Barley-grass		1
<i>Hornungia procumbens</i>	Oval Purse		0
<i>Limonium companyonis</i>	Sea-lavender	RA	7
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		-
<i>Medicago minima</i>	Little Medic		1
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Melilotus indicus</i>	King Island Melilot		1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4



## Cell Descriptions – EP 49 Loch Well Beach

Species	Common Name	Status	Study rating
<i>Minuartia mediterranea</i>	Slender Sandwort		0
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Plantago coronopus</i> ssp. <i>coronopus</i>	Bucks-horn Plantain		2
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Sagina apetala</i>	Annual Pearlwort		0
<i>Silene nocturna</i>	Mediterranean Catchfly		1
<i>Silene tridentata</i>			0
<i>Sonchus oleraceus</i>	Common Sow-thistle		0
<i>Vulpia</i> sp.	Fescue		2

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia spinescens</i>	Spiny Wattle		
<i>Acacia triquetra</i>	Mallee Wreath Wattle		
<i>Acrotriche cordata</i>	Blunt-leaf Ground-berry		
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Caladenia stricta</i>	Upright Caladenia		
<i>Calandrinia</i> sp.	Purslane/Parakeelya		
<i>Carpobrotus</i> sp.	Pigface		
<i>Chrysocephalum apiculatum</i>	Common Everlasting		
<i>Comesperma volubile</i>	Love Creeper		
<i>Cotula vulgaris</i> var. <i>australasica</i>	Slender Cotula		
<i>Crassula colligata</i> ssp. <i>lamprosperma</i>			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Eremophila crassifolia</i>	Thick-leaf Emubush		
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>	Coastal White Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Frankenia pauciflora</i> var.	Southern Sea-heath		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Gabnia lanigera</i>	Black Grass Saw-sedge		
<i>Goodenia blackiana</i>	Native Primrose		
<i>Goodenia willisiana</i>	Silver Goodenia		
<i>Helichrysum leucopsidium</i>	Satin Everlasting		
<i>Lasiopetalum discolor</i>	Coast Velvet-bush		
<i>Lichen</i> sp.			
<i>Lomandra collina</i>	Sand Mat-rush		
<i>Lomandra effusa</i>	Scented Mat-rush		
<i>Lomandra micrantha</i> ssp.	Small-flower Mat-rush		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Microtis</i> sp.	Onion-orchid		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Oxalis perennans</i> (NC)	Native Sorrel		
<i>Pimelea flava</i> ssp. <i>dichotoma</i>	Diosma Riceflower		
<i>Pittosporum angustifolium</i>	Native Apricot		

## Cell Descriptions – EP 49 Loch Well Beach

Species	Common Name	Aus status	SA status
<i>Plantago hispidula</i>	Hairy Plantain		
<i>Poa drummondiana</i>	Knotted Poa		R
<i>Podotheca angustifolia</i>	Sticky Long-heads		
<i>Pogonolepis muelleriana</i>	Stiff Cup-flower		
<i>Poranthera triandra</i>	Three-petal Poranthera		
<i>Prasophyllum</i> sp. <i>Coast sandbills</i> (Hj.Eichler 14100)	Scented Leek-orchid		
<i>Pultenaea tenuifolia</i>	Narrow-leaf Bush-pea		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Sclerolaena uniflora</i>	Small-spine Bindyi		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Spyridium phylloides</i>	Narrow-leaf Spyridium		
<i>Templetonia retusa</i>	Cockies Tongue		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Thryptomene micrantha</i>	Ribbed Thryptomene		
<i>Thysanotus baueri</i>	Mallee Fringe-lily		
<i>Tricoryne tenella</i>	Tufted Yellow Rush-lily		
<i>Triglochin mucronata</i>	Prickly Arrowgrass		
<i>Triodia compacta</i>	Spinifex		
<i>Vittadinia megacephala</i>	Giant New Holland Daisy		
<i>Westringia dampieri</i>	Shore Westringia		
<i>Zygophyllum billardierei</i> (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	53 (49*) recorded – 36 (35*) birds, 11 (10*) reptile, (0*) butterflies, 6 (4*) mammals, (0*) amphibian (an additional 13 reptiles and 24 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	5 (2*) survey sites, 9 (6*) opportune sites
<b># of threatened fauna in cell</b>	4 (4*)
<b># of non-indigenous fauna</b>	5 (4*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Alauda arvensis</i>	Eurasian Skylark	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Mus musculus</i>	House Mouse	Mammalia	
<i>Oryctolagus cuniculus</i>	Rabbit (European Rabbit)	Mammalia	
<i>Vulpes vulpes</i>	Fox (Red Fox)	Mammalia	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

## Cell Descriptions – EP 49 Loch Well Beach

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Anthus australis</i>	Australian Pipit		
<i>Aphelocephala leucopsis</i>	Southern Whiteface		
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Chalcites basal</i>	Horsfield's Bronze Cuckoo		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Corvus mellori</i>	Little Raven		
<i>Coturnix pectoralis</i>	Stubble Quail		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Endiptyula minor</i>	Little Penguin		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus cyanus</i>	Superb Fairywren		
<i>Malurus cyanus leggei</i>	Superb Fairywren (Mainland SA)		
<i>Malurus lamberti</i>	Variegated Fairywren		
<i>Morus serrator</i>	Australasian Gannet		
<i>Neophema elegans</i>	Elegant Parrot		R
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Thinornis cucullatus</i>	Hooded Plover (Hooded Dotterel)	VU	V
<i>Zosterops lateralis</i>	Silveryeye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p

## Cell Descriptions – EP 49 Loch Well Beach

Species	Common Name	Status*	Record
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kersbawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acaata</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinesthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

Species	Common Name	Aus status	SA status
<i>Cercartetus concinnus</i>	Western Pygmy-possum		
<i>Macropus (Ospbranter) robustus</i>	Blue		
<i>Macropus sp.</i>			

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Christinus marmoratus</i>	Marbled Gecko			
<i>Cryptoblepharus australis</i>	Desert Wall Skink			
<i>Ctenophorus fionni</i>	Eyre Peninsula Dragon			
<i>Ctenophorus pictus</i>	Painted Dragon			
<i>Diplodactylus vittatus complex (NC)</i>	Stone Geckos			
<i>Hemiergis peronii</i>	Four-toed Earless Skink			
<i>Lerista bougainvillii</i>	Bougainville's Skink			
<i>Pseudechis australis</i>	Mulga Snake			
<i>Pygopus lepidopodus</i>	Common Scaly-foot			
<i>Tiliqua rugosa</i>	Sleepy Lizard			
<i>Underwoodisaurus milii</i>	Common Barking Gecko			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

Blue = recorded in 2019, new since 2011

## Cell Descriptions – EP 49 Loch Well Beach

### **Amphibians**

No amphibian species recorded in 2011 or 2019 data.

## Cell EP 66 Streaky Bay

Cell area 15,263 ha. Shoreline length 15.26 km.



### Landforms

This cell is a low coastal plain facing a very sheltered shallow embayment. The coastal plain calcarenite with some thin Pleistocene sediments. The shoreline NE of Streaky Bay holds small amounts of Holocene sand in discontinuous narrow beaches and dunes, separated by small calcarenite headlands, reefs and islands; NW of Streaky Bay the shoreline is low calcarenite cliffs and bluffs, with small saltmarsh features.

The broad embayment of Streaky Bay has sand and fines driven by waves from the west; these sediments form sand spits and saltmarsh from Cape Bauer to Gibson Point, but only small amounts appear to be driven into the extreme low energy shore of Cell 66. Mainly fine sediments accumulate in small saltmarsh features immediately NW of Doctors Beach.

### Benthic Habitat

Shallow sandflats and patchy seagrass.

### Biota

Remnant vegetation covers 93 ha - 12% of the cell. There are one flora survey site, three opportune flora survey sites, four herbarium record sites and 56 opportune fauna survey sites. Dunes are recorded as *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa*, *Tetragonia implexicoma*, *Rhagodia candolleana* ssp. *candolleana*, *Pimelea serpyllifolia* ssp. *serpyllifolia* low shrubs over *Muehlenbeckia adpressa*, *Dianella brevicaulis*.

Saltmarsh near Doctors Beach is mapped as *Tecticornia halocnemoides* ssp., *Tecticornia* sp., *Disphyma crassifolium* ssp. *clavellatum*, *Frankenia foliosa*, *Maireana appressa* low shrubland

There are small isolated areas of *Eucalyptus gracilis*, +/- *Eucalyptus dumosa*, +/- *Eucalyptus brachycalyx*, +/- *Eucalyptus oleosa* ssp. *ampliata* mid open mallee forest over *Geijera linearifolia*, *Melaleuca lanceolata* shrubs near the inner coastal boundary.

### Land Use/ Land Ownership

Traditional lands of the Wirangu people. There is a narrow reserve of unalienated Crown land along the shoreline of this cell; there is a wider area of Crown land reserve at Doctors Beach and the saltmarsh lowland to the NW.



## Cell Descriptions – EP 66 Streaky Bay

### Uses (Field visits and local reports)

Township – Streaky Bay.

Conservation – Coastal Crown reserves.

Agriculture – Grazing (small area).

Commercial fishing – Charters, crabs, scale fish.

Aquaculture – Oysters, land-based (abalone).

Industry - Jetty for unloading catch.

Recreation and Tourism – Two Caravan Parks, sightseeing, nature (bird watching), hiking, swimming, snorkelling, recreational fishing, camping – formal and informal, horse riding, dog walking, diving, ORV use (four-wheel drive, motorbikes), boating, walking trails.

Boat launching – Beach; boat ramp.



**FIGURE 6.81 Streaky Bay Township showing shallow sandflats and smaller saltmarsh features to the right of the photo. Coast Protection Board, 2018**

### Values (Field visits and local reports)

Conservation – Important habitat for sea birds (Fairy Tern, Pied Oyster Catcher, Red Capped Plover).

Valued as popular site for tourism with a number of scenic drives and beach walks to appreciate the natural beauty of this area.

### Threats (Field visits and local reports)

Agriculture – Grazing.

Proximity to Aquaculture – Interferences with coastal processes, pollution including marine debris and aquaculture outflows, increased nutrient loads, and damage to intertidal zone.

Over fishing.

Stormwater impacts causing erosion, weed proliferation, and marine pollution.

## Cell Descriptions – EP 66 Streaky Bay

Uncontrolled access – ORV use (including speeding and fauna fatalities), informal camping and encroachment outside of formal camping areas, pedestrian access and horse riding leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Dogs uncontrolled on beaches - Disturbance of shorebirds.

Boat launching – Public safety.

Feral animals – Foxes, cats, rabbits.

Weed infestation – African Boxthorn, garden escapees particularly along coastal strips of Crown land.

Climate change - Storm surge.

### Opportunities (Field visits and local reports)

Opportunity to develop and implement coastal management plans in collaboration with landholders, EP Landscape Board and community with particular focus on addressing foreshore rehabilitation, revegetation, pest plant and animal control, access management, stormwater management and dune drift.

Residents associations, local businesses, schools and other community groups – Undertake actions to improve amenity and maintain and improve environmental value such as environmental weed control and revegetation.

### Conservation Analysis (GIS)

The total conservation means is 74.7 which is low for the region. Low to medium low totals predominate, with the exception of fairly small areas of medium high totals in the Crown land reserve and the dunes on the eastern shore of the cell. The principal layers contributing to the conservation total are: priority based on the number of threatened bird species and number of bird species (the Crown land reserve is a significant bird habitat), number of threatened mammal species (dunes), habitat of the Eastern Osprey, habitat of the White-bellied Sea Eagle, Viewscope and Viewshed, and presence of a registered Indigenous heritage site. Some more modest values are added in the dunes from 1D Threatened status of fauna, 1E Total number of threatened species, species richness and number of reptile species.

The 2019 review showed four new native flora species records and eleven additional weed species records since the 2011 analysis, with 19 flora species records by the 2019 review. The 2019 review showed 16 additional native fauna species records since the 2011 analysis. This increase is not reflected in the total number of species records with 107 fauna species records by the 2019 review compared with 109 in 2011, which can be explained by the removal of 19 fauna records since the 2011 analysis as part of the BDBSA data update process (e.g. they may have been considered unreliable). Four of the new fauna records include species with a conservation rating (excluding ssp) – the Eastern Cattle Egret, *Bubulcus ibis coromandus*, listed as rare under the *National Parks and Wildlife Act 1972*, the Osprey, *Pandion haliaetus* and the Australian Little Bittern (Black-backed Bittern), *Ixobrychus dubius*, both listed as endangered under the NPW Act and the Southern Giant Petrel, *Macronectes giganteus*, listed as vulnerable under the NPW Act and Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

If the analysis were repeated for this cell, with only slight increases in flora species richness, the number of threatened bird species, this would still not be enough to raise the conservation rating of the cell to Medium. The rating would remain low.



## Cell Descriptions – EP 66 Streaky Bay

### Threat Analysis (GIS)

The total for threat means is high at 59.265. The distribution of detailed totals for all threats shows that almost the whole cell has a high threat total, with only small areas having medium high totals. Development zoning, land use and land ownership, viewscape and viewshed, existing development, ORV activity, vegetation block degradation, and presence of dangerous weeds and rabbits are all notable threats. ORV activity is evident in the small dune areas and the high threat uses near the Crownland present challenges to the restricted areas of conservation priority in this cell.

Current reports of the increased impact of ORV use (including speeding and fauna fatalities), informal camping and encroachment outside of formal camping areas, pedestrian access and horse riding leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds. There were eleven new weed species record identified in the 2019 data review, Ward's Weed, a Red Alert Weed and Lincoln Weed and Gazania both Declared species. There is also a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains High.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

<b>Climate change element/ scenario</b>	<b>Impacts and implications (for this cell)</b>	<b>Protect and manage habitat threats</b>	<b>Address landscape issues: fire, connectivity, refuges, hydrology</b>
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise: 2030: +c.20cm</b>	Beach recession will increase due to sea level rise and dune instability due to foredune damage; Increase in dune mobility; Saltmarsh areas with marine connection quickly affected by change in tidal inundation. Doctor Beach intertidal samphire habitat has nowhere to retreat with sea level rise due to Squeeze against a road with a new subdivision immediately inland.	Active management of dunes; Consider possible retreat buffer zones for dunes - re-zoning on land use and development plans needed; Intertidal samphire habitat has nowhere to retreat due to new subdivision and road immediately to the rear of the samphire habitat. Monitor and review any retreat options.	

## Cell Descriptions – EP 66 Streaky Bay

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm	Dune instability and movement further increased; Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	Storm drain infrastructure can become overwhelmed in peak events.		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes; Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

## Cell Descriptions – EP 66 Streaky Bay

**TABLE 6.77 Recommended Actions and Priority for EP66 Streaky Bay**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Climate change and ongoing and accelerating sea level rise beginning to cause significant erosion change in dunes and saltmarsh.	Create a baseline for monitoring shoreline change by establishing a rectified aerial photographic record at an appropriate resolution; Maintain connection between vegetation blocks to maximise resilience.	High (cons/threat)	DEW, EP Landscape Board DC Streaky Bay
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, landowners, community groups, DC Lower Eyre Peninsula, EP Landscape Board, DEW, DPC
	Management of stock in the coastal zone.	Continue to work with private landowners to ensure that stock are restricted from the unalienated Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	High (cons/threat)	EP Landscape Board, landholders, DEW
	Environmental weed management especially garden escapees from Streaky Bay Township (such as <i>Gazania</i> sp).	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants.	Medium (cons/threat)	DEW, EP Landscape Board, DC Streaky Bay community
	Continue access management and walking trail upgrades to maintain coastal vegetation health.	Upgrading of walking trails to improve amenity and undertaking access management and control to areas where access by vehicles is inappropriate.	Medium (cons)	DEW, EP Landscape Board, DC Streaky Bay
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Medium (cons/threat)	EP Landscape Board, DC Streaky Bay, private landholders, DEW

## Cell Descriptions – EP 66 Streaky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
		Community education about impacts of uncontrolled dogs and cats.		
	Water management and storm water runoff. Storm water impacts on coast and marine environment (e.g. pollution, rubbish, erosion, sediment movement).	Township could use infrastructure upgrades such as rain gardens and other water sensitive design to improve storm water runoff quality before it enters the ocean.	Medium (cons/threat)	DEW, EP Landscape Board
	This area is a significant habitat for threatened bird species and, focal species for this project. Management of interactions with threatened shorebirds to ensure their survival.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season; Continue surveys for Bushland Condition Monitoring sites around Streaky Bay. Support continued bird surveys by Jane Cooper. Improve management of nesting site(s), access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia DC Streaky Bay, community
	ORV activity including horse riding and informal camping is applying strong pressure on the coastal reserves. Associated vegetation block degradation threatens to further de-stabilise these small remnant dune areas.	Rationalise tracks and camping points through consultation and local access control. Coastal management plans prepared and implemented with particular emphasis on foreshore rehabilitation, revegetation, pest plant and animal control, access	High (cons/threat)	DEW, EP Landscape Board, community DC Streaky Bay, Tourism SA

## Cell Descriptions – EP 66 Streaky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
		control, and stormwater management.		
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, DC of Streaky Bay
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons/threat)	DEW, EP Landscape Board
	Access management and ensuring conservation sensitive walking trail upgrades.	Collaboration between land managers to ensure management activities and walking trail development and maintenance occurs in an environmentally sensitive manner.	Medium (cons)	DC Streaky Bay, DEW, EP Landscape Board
Dunes	As sea level rise accelerates, dunes with beach connection are increasingly affected by storm foredune damage, blowout development and weed invasion, leading to dune recession; Increasing aridity encourages grassy weed invasion of all dunes.	Active dune management including access control, active revegetation and weed management and drift net fencing where appropriate.	Medium (cons/threat)	DEW, EP Landscape Board
Saltmarsh within the Crown land Reserve	Tide dependant species are rapidly affected by sea level rise; This area has values as a bird habitat. The intertidal samphire habitat has nowhere to retreat with sea level rise due to road and subdivision immediately to the rear of the habitat.	Ensure that road maintenance/construction or other development allows tidal circulation to saltmarsh communities. Upgrade where necessary to allow for tidal movement. Monitor and review saltmarsh remnants and management options, but this habitat will be lost as sea level rises due	High (cons/threat)	DC Streaky Bay, DEW, EP Landscape Board, DC Streaky Bay, DPC Planning

## Cell Descriptions – EP 66 Streaky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
		to development and no potential for retreat.		
	All saltmarsh areas show the potential for coastal acid sulfate soils following disturbance; in turn this would potentially threaten life forms within the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (cons/threat)	DEW, EP Landscape Board, DC Streaky Bay Developers and private landholders
Township areas	Stormwater management.	Township could use infrastructure upgrades such as rain gardens to improve water quality as it enters the ocean.	Medium (threat)	DC Streaky Bay, EP Landscape Board, EPA, community
Water management and storm water runoff	Storm water impacts on coast and marine environment (e.g. pollution, rubbish, erosion, sediment movement).	Township could use infrastructure upgrades such as rain gardens and other water sensitive design to improve storm water runoff quality before it enters the ocean.	Medium (cons/threat)	DC Streaky Bay, EP Landscape Board

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	92.77 ha (12.31% of the cell)
<b># flora surveys / records</b>	1 (0*) surveys, 3 (1*) opportune sites, 4 (3*) Herbarium records
<b># flora in cell</b>	19 (4*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	12 (1*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	No vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Arctotheca calendula</i>	Cape Weed		1
<i>Avena sp.</i>	Oat		-
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Coleonema pulchellum</i>	Diosma		3

## Cell Descriptions – EP 66 Streaky Bay

Species	Common Name	Status	Study rating
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3
<i>Gazania linearis</i>	Gazania	D	-
<i>Hordeum leporinum</i>	Wall Barley-grass		-
<i>Malva parviflora</i>	Small-flower Marshmallow		-
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Salvia verbenaca</i> var.	Wild Sage		-
<i>Sisymbrium irio</i>	London Mustard		-
<i>Sisymbrium</i> sp.	Wild Mustard		-

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia cupularis</i>	Cup Wattle		
<i>Acacia</i> sp.	Wattle		
<i>Atriplex semibaccata</i>	Berry Saltbush		
<i>Dodonaea baueri</i>	Crinkled Hop-bush		
<i>Eucalyptus</i> sp.			
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Wilsonia humilis</i>	Silky Wilsonia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	107 (109*) recorded – 103 (108*) birds, 2 (1*) reptile, 0 (0*) butterflies, 1 (0*) mammals, 1 (0*) amphibian (an additional 21 reptiles and 2 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 56 (15*) opportune sites
<b># of threatened fauna in cell</b>	20 (23*)
<b># of non-indigenous fauna</b>	6 (4*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Litoria cyclorhyncha</i>	Spotted-thighed Frog	Amphibia	
<i>Anas platyrhynchos</i>	Mallard (Northern Mallard)	Aves	
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	

## Cell Descriptions – EP 66 Streaky Bay

Species	Common Name	Class	Record
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Blue = recorded in 2019, new since 2011

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Acanthiza chrysothroa</i>	Yellow-rumped Thornbill		
<i>Accipiter fasciatus</i>	Brown Goshawk		
<i>Acrocephalus australis</i>	Australian Reed Warbler		
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas castanea</i>	Chestnut Teal		
<i>Anas gracilis</i>	Grey Teal		
<i>Anas superciliosa</i>	Pacific Black Duck		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)		
<i>Ardea alba modesta</i>	Great Egret		
<i>Aythya australis</i>	Hardhead		
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Bubulcus ibis coromandus</i>	Eastern Cattle Egret		R
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo		
<i>Cacomantis pallidus</i>	Pallid Cuckoo		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris alba</i>	Sanderling		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Cereopsis novaehollandiae</i>			
<i>novae-hollandiae</i>	Cape Barren Goose		R
<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo		
<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU	R
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chenonetta jubata</i>	Maned Duck		
<i>Chlidonias hybrida</i>	Whiskered Tern		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Cygnus atratus</i>	Black Swan		
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Falco berigora</i>	Brown Falcon		



Cell Descriptions – EP 66 Streaky Bay

Species	Common Name	Aus status	SA status
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco longipennis</i>	Australian Hobby		
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Fulica atra</i>	Eurasian Coot		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		E
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Ixobrychus dubius</i>	Australian Little Bittern (Black-backed Bittern)		E
<i>Larus pacificus</i>	Pacific Gull		
<i>Leucophaeus pipixcan</i>	Franklin's Gull		
<i>Macronectes giganteus</i>	Southern Giant Petrel	EN	V
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Megalurus gramineus</i>	Little Grassbird		
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Morus serrator</i>	Australasian Gannet		
<i>Ninox boobook</i>	Southern Boobook		
<i>Oceanites oceanicus</i>	Wilson's Storm Petrel		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pachycephala rufiventris rufiventris</i>	Rufous Whistler		
<i>Pandion haliaetus</i>	Osprey		E
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon nigricans</i>	Tree Martin		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Platalea regia</i>	Royal Spoonbill		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater		
<i>Purnella albifrons</i>	White-fronted Honeyeater		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Smicromis brevirostris</i>	Weebill		
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		
<i>Thalassarche chlororhynchos</i>	Yellow-nosed Albatross	ssp	ssp
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Todiramphus sanctus</i>	Sacred Kingfisher		
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Tringa stagnatilis</i>	Marsh Sandpiper		
<i>Vanellus miles</i>	Masked Lapwing		

## Cell Descriptions – EP 66 Streaky Bay

Species	Common Name	Aus status	SA status
<i>Vanellus tricolor</i>	Banded Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acaata</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

Species	Common Name	Aus status	SA status
<i>Lobodon carcinophaga</i>	Crabeater Seal		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Pseudechis australis</i>	Mulga Snake			
<i>Pseudonaja aspidorhyncha</i>	Patch-nosed Brown Snake			

## Cell Descriptions – EP 66 Streaky Bay

Species	Common Name	Aus status	SA status	Record
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R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

Blue = recorded in 2019, new since 2011

### Amphibians

No amphibian species recorded in 2011 or 2019 data.

**Cell EP 67 Eba Island/Thomas Landing**

Cell area 1074.88 ha. Shoreline length 20.2 km.



Landforms

This is a low energy coast, protected by shoals, a headland (Cape Bauer), and islands (Eba and Pigface). The coastal plain is in undulating Pleistocene calcarenite, with degraded sand drift. The shoreline is low cliffs and bluffs, with small sand stores in embayments and dunes. Unstable dunes backing Perlubie are Holocene; beach/ foredune ridges in the dunes behind Pigface Bay are dated at rear (earliest) at 3290BP (Short et al p.112). The beaches are reflective, with wide intertidal sand flats; high tide beaches here are steep, with coarse calcareous sands. Headlands are in calcarenite, without shore platforms.

Benthic Habitat

State benthic mapping indicates continuous dense to patchy medium seagrass; some sections in northern coast unconsolidated bare substrate; also northwest has

sections of continuous, dense low profile reef.

Biota

Remnant vegetation covers an area of 545 ha, 51 % of the cell. There are three flora survey record sites, one opportune flora survey site, eight herbarium record sites, two fauna survey sites including 1 reserve database fauna record site and 28 opportune fauna survey sites.

Land Use/Land Ownership

Far West Coast Sea Claim Native Title area.

A narrow strip of unalienated Crown land extends the length of this Cell. The Cell also comprises two offshore islands, Eba Island Conservation Park and Pigface Island Conservation Park.



**FIGURE 6.82 Perlube Beach dunefields Photo: Coast Protection Board, 2018**

*Uses (Field visits and local reports)*

Townships – Eba Anchorage and Perlubie.

Conservation – Eba Island Conservation Park; Pigface Island Conservation Park; Crown coastal reserve.

Agriculture – Cropping, grazing.

Commercial fishing – Crabs, scale fish.

Aquaculture – Streaky Bay Aquaculture Zone includes all neighbouring waters.

Recreation and Tourism – Shacks (Eba Island; Perlubi), sightseeing, nature (bird watching), hiking, swimming, snorkelling, recreational fishing, informal camping (Eba Island and Perlubie), horse riding, dog walking, diving, ORV use (four-wheel drive, motorbikes), boating.

Boat launching – Unofficial boat ramps at Eba and Perlubie.

*Values (Field visits and local reports)*

Conservation – important habitat for sea birds and shore birds, some with threatened status (White-bellied Sea Eagle, Pied Oyster Catcher, Fairy Tern, Red Capped Plover).

*Threats (Field visits and local reports)*

Agriculture – Grazing.

Proximity to Aquaculture – interferences with coastal processes, pollution including marine debris and aquaculture outflows, increased nutrient loads, and damage to intertidal zone.

Over fishing – Recreational.

Stormwater impacts causing erosion, weed proliferation, and marine pollution.

Uncontrolled access – ORV use (including speeding and fauna fatalities), informal camping and encroachment outside of formal camping areas, pedestrian access and horse riding leading to

## Cell Descriptions – EP 67 Eba Island/Thomas Landing

track creation, vegetation destruction, dune erosion, disturbance of shorebirds and risk to beach users.

Boat launching – Public safety; increasing number of vehicles launching boats off Eba beach.

Feral animals – Foxes, cats, rabbits.

Weed infestation – Garden escapees particularly along coastal strips of Crown land; African Boxthorn.

Future development – Residential; tourism.

Climate change - Storm surge.

Wildfire.

### Opportunities (Field visits and local reports)

Opportunities for coastal management plans to be developed and implemented by DEW, DC of Streaky Bay and private landholders with particular emphasis on pest plant and animal control.

### Conservation Analysis (GIS)

The total of conservation means, 90.35, is low for the region. Totals are largely low to medium in the northern Perlube Beach part of the cell. Vegetated areas, largely in the southern half of the cell are medium to medium high, the rest of the cell is low; only a small area of dune near the southern boundary of the cell supports a medium high total. Moderate to medium high values are also widespread for species richness; widespread high values are also found for viewshed and viewscape and vegetation block metrics and medium high for connectivity. High Values for endemic floristic vegetation, widespread low ratings for species richness except for medium around Windmill Point. Widespread low for habitat for threatened bird species, habitat for threatened reptile/amphibian with patches of moderate around Eba Anchorage Road and high along the embayments. Moderate values for Eastern Osprey (Focal Species) around Windmill Point and the offshore Islands, High for White-Bellied Sea Eagle (Focal Species) for entire cell except for moderate for northern areas around Perlube Beach and High for over 50% of the cell for the Beach Slider and Bight Coast Skink Focal Species, but low for threatened mammals.

The 2019 review showed 24 new native flora species records and four additional weed species records since the 2011 analysis, with 112 flora species records by the 2019 review compared to 97 in the 2011 study. One of the new fauna records, Coccid Emubush, *Eremophila gibbifolia*, has a conservation rating of Rare at a Federal level. 18 flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed 16 new native fauna species records since the 2011 analysis with 55 fauna species records by the 2019 review compared with 43 in the 2011 study. Three fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). If the analysis were repeated for this cell, with only slight increases in flora species richness, the number of threatened bird species and fauna species richness, this would still not be enough to raise the conservation rating of the cell to Medium. The rating would remain low.

### Threat Analysis (GIS)

The total of threat means is 55.26, high for the region. The detailed map of threat totals shows medium to high totals almost everywhere through the cell. Contributors to this threat total include land ownership, viewshed and viewscape, land use (very high), medium high weed distribution in the middle of the cell around Eba Anchorage, prevalence of exotic vegetation species, presence of declared and red alert weeds, and dune instability within Perlube Beach dunefields. ORV activity is not significantly evident from aerial photography but ongoing issues

## Cell Descriptions – EP 67 Eba Island/Thomas Landing

as mentioned below. The high endemicity shrubland is especially threatened by ownership and weeds.

Ongoing reports of the impacts from ORV use (including speeding and fauna fatalities), informal camping and encroachment outside of formal camping areas, pedestrian access and horse riding leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds and risk to beach users. Reports of garden escapees particularly along coastal strip of Crown land as well as African Boxthorn. There were four new weed species records identified in the 2019 data review, but no additional species with a Declared or Red Alert rating. There is also a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains High.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility.	Active management of dunes; Consider possible retreat buffer zones for dunes - re-zoning on land use and development plans needed.	
2070: +c.80cm	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale; <i>Intensity</i> of large storms increases	2030: Occasional storm tide flooding above highest known tides; damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	



## Cell Descriptions – EP67 Eba Island

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	NA		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes;  Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.78 Recommended Actions and Priority for Cell EP67 Eba Island/Thomas Landing**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/threat)	DEW, EP Landscape Board



## Cell Descriptions – EP67 Eba Island

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
	Managing impacts from stock grazing in the coastal zone.	Continue to work with private landowners to ensure that stock are restricted from the unalienated Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	Medium (cons/threat)	DEW, EP Landscape Board, landowners
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Medium (cons/threat)	EP Landscape Board, DC Streaky Bay, private landowners, DEW
	Management of weeds (African Boxthorn and garden escapees).	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants.	Medium (cons/threat)	EP Landscape Board, private landowners, DC of Streaky Bay, DEW
	Management of stormwater from Eba and Perlubie using sensitive design such as rain gardens to clean water before it enters the ocean.	Infrastructure upgrades such as rain gardens to improve water quality as it enters the ocean.	Medium (threat)	DC Streaky Bay, EP Landscape Board, community
	This area is a significant habitat for threatened bird species and, focal species for this project. Management of interactions with threatened shorebirds to ensure their survival; Management of interactions with WBSE, particularly on the islands.	Review management and land management practices in these areas. Implement actions to improve, protect and mitigate threats to these areas eg. continue Hooded Plover biennial count and territory monitoring during the nesting season; improve management of nesting site(s), access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations.  Review development plan zoning to these areas to increase protection.	High (cons/threat)	DEW, EP Landscape Board, Birds Australia DC Streaky Bay community

## Cell Descriptions – EP67 Eba Island

Component	Issue	Proposed Action	Priority of Action	Key Players
		Community education programs. Install interpretive/educational signage.		
	ORV activity including horse riding and informal camping is applying strong pressure on the coastal reserves.	Rationalise tracks and camping points through consultation and local access control. Coastal management plans prepared and implemented with particular emphasis on foreshore rehabilitation, revegetation, pest plant and animal control, access control, and stormwater management.	High (Cons/threat)	DEW, EP Landscape Board, community DC Streaky Bay Tourism SA
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, DC of Streaky Bay
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, landowners, community groups, DC Streaky Bay, EP Landscape Board, DEW, DPC
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons/threat)	DEW, EP Landscape Board
Dunes	As sea level rise accelerates, dunes with beach connection are increasingly affected by storm foredune damage, blowout development and weed invasion, leading to dune recession	Active dune management.	Medium (cons/threat)	DEW, EP Landscape Board

## Cell Descriptions – EP67 Eba Island

Component	Issue	Proposed Action	Priority of Action	Key Players
	Increasing aridity encourages grassy weed invasion of all dunes, including cliff top dunes.	Active dune management.	Medium (cons/threat)	DEW, EP Landscape Board
Back barrier lowlands	Rising sea level increases saline groundwater pressure.	Monitor ground water for salinity levels to manage plant and soil assets.	Medium (cons/threat)	DEW

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	545.24 ha (50.73% of the cell)
<b># flora surveys / records</b>	3 (17*) surveys, 1 (0*) opportune sites, 8 (5*) Herbarium records
<b># flora in cell</b>	112 (97*)
<b># conservation rated flora in cell</b>	2 (1*)
<b># non-indigenous flora in cell</b>	28 (29*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	11.62% of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avena barbata</i>	Bearded Oat		2
<i>Avena sp.</i>	Oat		-
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus rubens</i>	Red Brome		2
<i>Buglossoides arvensis</i>	Sheepweed		0
<i>Carrichtera annua</i>	Ward's Weed	RA	4
<i>Chenopodium album</i>	Fat Hen		0
<i>Ehrharta villosa var. maxima</i>	Pyp Grass	RA	8
<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill		0
<i>Galium murale</i>	Small Bedstraw		0
<i>Leontodon rhagadioloides</i>	Cretan Weed		-
<i>Lolium multiflorum</i>	Italian Ryegrass		1
<i>Lolium perenne</i>	Perennial Ryegrass		1
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Lysimachia arvensis</i>	Pimpernel		-
<i>Malvastrum americanum var. americanum</i>	Malvastrum		-

Cell Descriptions – EP67 Eba Island

Species	Common Name	Status	Study rating
<i>Medicago arabica</i>	Spotted Medic		0
<i>Medicago minima</i>	Little Medic		1
<i>Medicago polymorpha</i>	Burr-medic		1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Moraea setifolia</i>	Thread Iris		0
<i>Romulea rosea var. australis</i>	Common Onion-grass		2
<i>Sisymbrium orientale</i>	Indian Hedge Mustard		0
<i>Sisymbrium sp.</i>	Wild Mustard		-
<i>Sonchus asper</i>	Rough Sow-thistle		0
<i>Sonchus oleraceus</i>	Common Sow-thistle		0
<i>Trifolium arvense var. arvense</i>	Hare's-foot Clover		2

D: Declared weed, RA: Red alert weed

Blue = recorded in 2019, new since 2011

**Native flora**

Species	Common Name	Aus status	SA status
<i>Acacia anceps</i> (NC)	Angled Wattle		
<i>Acacia ancistrophylla var. lissophylla</i>	Hook-leaf Wattle		
<i>Acacia euthycarpa</i>	Wallowa		
<i>Acacia ligulata</i>	Umbrella Bush		
<i>Acacia ligulata</i> (NC)	Umbrella Bush		
<i>Acacia longifolia ssp. sophorae</i>	Coastal Wattle		
<i>Acacia oswaldii</i>	Umbrella Wattle		
<i>Acacia sp. Winged</i> (C.R. Alcock 4936)	Angled Wattle		
<i>Acrotriche affinis</i>	Ridged Ground-berry		
<i>Acrotriche patula</i>	Prickly Ground-berry		
<i>Atriplex paludosa ssp. cordata</i>	Marsh Saltbush		
<i>Atriplex vesicaria ssp.</i> (NC)	Bladder Saltbush		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Austrostipa nitida</i>	Balcarra Spear-grass		
<i>Austrostipa sp.</i>	Spear-grass		
<i>Beyeria lechenaultii</i>	Pale Turpentine Bush		
<i>Brachyscome ciliaris var. ciliaris</i>	Variable Daisy		
<i>Callitris gracilis</i>	Southern Cypress Pine		
<i>Carpobrotus rossii</i>	Native Pigface		
<i>Carpobrotus rossii</i> (NC)	Native Pigface		
<i>Carpobrotus sp.</i>	Pigface		
<i>Cassutha sp.</i>	Dodder-laurel		
<i>Chrysocephalum apiculatum</i> (NC)	Common Everlasting		
<i>Comesperma volubile</i>	Love Creeper		
<i>Compositae sp.</i>	Daisy Family		
<i>Danthonia sp.</i> (NC)	Wallaby-grass		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dodonaea baueri</i>	Crinkled Hop-bush		
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush		
<i>Eremophila crassifolia</i>	Thick-leaf Emubush		
<i>Eremophila deserti</i>	Turkey-bush		
<i>Eremophila gibbifolia</i>	Coccid Emubush		R

Cell Descriptions – EP67 Eba Island

Species	Common Name	Aus status	SA status
<i>Eremophila glabra</i> (NC)	Tar Bush		
<i>Eremophila glabra</i> ssp. <i>glabra</i>	Tar Bush		
<i>Eremophila glabra</i> ssp. <i>murrayana</i>	Small Tar Bush		
<i>Erodium cymorum</i> ssp. <i>glandulosum</i> (NC)	Clammy Heron's-bill		
<i>Eucalyptus brachycalyx</i>	Gilja		
<i>Eucalyptus calcareana</i>	Nundroo Mallee		
<i>Eucalyptus dumosa</i>	White Mallee		
<i>Eucalyptus oleosa</i> (NC)	Red Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Goodenia ovata</i>	Hop Goodenia		
<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia		
<i>Gramineae</i> sp.	Grass Family		
<i>Haloragis acutangula</i> f.	Smooth Raspwort		
<i>Halosarcia</i> sp. (NC)	Samphire		
<i>Helichrysum leucopsideum</i>	Satin Everlasting		
<i>Lomandra collina</i>	Sand Mat-rush		
<i>Maireana brevifolia</i>	Short-leaf Bluebush		
<i>Maireana eriolada</i>	Rosy Bluebush		
<i>Maireana oppositifolia</i>	Salt Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree		
<i>Millotia muelleri</i>	Common Bow-flower		
<i>Myoporum parvifolium</i>	Creeping Boobialla		R
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Oxalis perennans</i> (NC)	Native Sorrel		
<i>Parietaria debilis</i> (NC)	Smooth-nettle		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podotroche angustifolia</i>	Sticky Long-heads		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Rhagodia crassifolia</i>	Fleshy Saltbush		
<i>Roepora apiculata</i>	Pointed Twinleaf		
<i>Roepora aurantiaca</i> ssp. <i>simplicifolia</i>	Shrubby Twinleaf		
<i>Roepora</i> sp.	Twinleaf		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Salsola australis</i>	Buckbush		
<i>Santalum acuminatum</i>	Quandong		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Scaevola spinescens</i>	Spiny Fanflower		
<i>Sclerolaena uniflora</i>	Small-spine Bindyi		
<i>Senna artemisioides</i> ssp. <i>petiolaris</i>			
<i>Senna artemisioides</i> ssp. <i>petiolaris</i> (NC)	Flat-stalk Senna		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Teucrium sessiliflorum</i>	Mallee Germander		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Trichanthodium skirrophorum</i>	Woolly Yellow-heads		
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy		
<i>Vittadinia megacephala</i>	Giant New Holland Daisy		
<i>Westringia rigida</i>	Stiff Westringia		
<i>Wurmbea dioica</i> ssp. <i>dioica</i> (NC)	Early Star-lily		
<i>Zygophyllum billardierei</i> (NC)	Coast Twinleaf		

## Cell Descriptions – EP67 Eba Island

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	55 (43*) recorded – 46 (38*) birds, 7 (3*) reptile, (0*) butterflies, 2 (2*) mammals, (0*) amphibian (an additional 26 reptiles and 27 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	2 (3*) survey sites including 1 Reserve Database Fauna Record Site, 28 (11*) opportune sites
<b># of threatened fauna in cell</b>	3 (3*) exc ssp
<b># of non-indigenous fauna</b>	5 (5*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Mus musculus</i>	House Mouse	Mammalia	
<i>Vulpes vulpes</i>	Fox (Red Fox)	Mammalia	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

Blue = recorded in 2019, new since 2011

### Birds

Species	Common Name	Aus status	SA status
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Circus assimilis</i>	Spotted Harrier		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus bennetti</i>	Little Crow		
<i>Corvus coronoides</i>	Australian Raven		
<i>Coturnix pectoralis</i>	Stubble Quail		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Eolophus roseicapilla</i>	Galah		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gallirallus philippensis mellori</i>	Buff-banded Rail		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R

Cell Descriptions – EP67 Eba Island

Species	Common Name	Aus status	SA status
<i>Himantopus leucocephalus</i>	White-headed Stilt		
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus cyaneus</i>	Superb Fairywren		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Podargus strigoides</i>	Tawny Frogmouth		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Pterodroma lessonii</i>	White-headed Petrel		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Smicrornis brevirostris</i>	Weebill		
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Strepera versicolor intermedia</i>	Brown Currawong		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Tyto delicatula delicatula</i>	Eastern Barn Owl		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

## Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus sthenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p

## Cell Descriptions – EP67 Eba Island

Species	Common Name	Status*	Record
<i>Theclinesthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinesthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No indigenous terrestrial mammal species recorded in 2011 or 2019 data.

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Amphibolurus sp.</i>				
<i>Christinus marmoratus</i>	Marbled Gecko			
<i>Ctenophorus pictus</i>	Painted Dragon			
<i>Demansia reticulata</i>	Desert Whipsnake			
<i>Hemiergus peronii</i>	Four-toed Earless Skink			
<i>Pseudonaja aspidorhyncha</i>	Patch-nosed Brown Snake			
<i>Pseudonaja sp.</i>				

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

Blue = recorded in 2019, new since 2011

### Amphibians

No amphibian species recorded in 2011 or 2019 data.



**Cell EP 68 Haslam**

Cell area 1738.5 ha. Shoreline length 44.7 km.



Landforms

This is an undulating, low coastal plain of Pleistocene calcarenite with low cliffs and bluffs, and with narrow to absent beaches. The beaches experience low to medium energy wave energy and the sands include granite fragments from Point Brown. Sand storage within this cell is slight, with only small amounts offshore; there are cliff top dunes, but these are low, discontinuous features. North of Haslam there are low calcarenite cliffs and the clifftop dunes are very narrow, then narrow beaches with dunes. South of Haslam the dunes are wider and have a direct connection with the narrow beaches; they occupy much of the coastal boundary and in many places the small de-stabilised Holocene white sands have moved landward over red Pleistocene surfaces. (These wider dune surfaces represent sand accumulation in the middle of the wider embayment).

Benthic Habitat

Very narrow inshore sand, with

medium to patchy seagrass offshore.

Biota

Remnant vegetation covers 1270 ha, 73% of the cell; 38% of the cell is dunes. There is one flora survey site, one threatened plant population flora record, one opportune flora survey site, six herbarium record sites and five opportune fauna survey sites.

Most dunes are in *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa*, *Tetragonia implexicoma*, *Rhagodia candolleana ssp. candolleana*, *Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa*, *Dianella brevicaulis*. However, south of Haslam there are about four kilometres of dunes with *Melaleuca lanceolata*, +/- *Olearia axillaris*, +/- *Leucopogon parviflorus* tall open shrubland over +/- *Rhagodia candolleana ssp. candolleana*, +/- *Threlkeldia diffusa* low shrubs. Near to Haslam there is a small area of *Eucalyptus dumosa* mid mallee woodland over *Melaleuca lanceolata*, *Melaleuca acuminata ssp. acuminata* tall shrubs.

Land Use/ Land Ownership

Wirangu No. 2 Native Title Claim.

The centre of this cell is Crown leasehold land; 5 kilometres at the northern end of the cell is privately owned with a narrow reserve of unalienated Crown land. The southern end of the cell is Heritage Agreement land.



**FIGURE 6.83 Haslam township. Photo: Coast Protection Board, 2018**

Uses (Field visits and local reports)

Township - Haslam.

Conservation – Coastal Crown Reserves and Heritage Agreements.

Agriculture – Cropping, grazing (small areas).

Commercial fishing – Crabs, scale fish.

Aquaculture – Pacific Oysters

Recreation and Tourism – Caravan Park, shacks (Haslam area), sightseeing, nature (Bird watching), hiking, swimming, snorkelling, recreational fishing, informal camping, horse riding, dog walking, diving, ORV use (four wheel drive, motorbikes, quad bikes), boating.

Boat launching – Boat ramp.

Values (Field visits and local reports)

Conservation – Important habitat for sea birds (Osprey, Fairy Tern, Pied Oyster Catcher, Red Capped Plover).

Threats (Field visits and local reports)

Agriculture – Grazing.

## Cell Descriptions – EP 68 Haslam

Proximity to Aquaculture – Interferences with coastal processes, pollution including marine debris and aquaculture outflows, increased nutrient loads, and damage to intertidal zone.

Over fishing – Recreational.

Stormwater impacts causing erosion, weed proliferation, and marine pollution.

Uncontrolled access – ORV use (including speeding and fauna fatalities and quad bikes visiting sand dunes more), informal camping and encroachment outside of formal camping areas, pedestrian access and horse riding leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

Boat launching – Public safety.

Feral animals – Foxes, cats, rabbits.

Weed infestation – Garden escapees particularly along coastal strips of Crown land; African Boxthorn.

Future development – Residential; tourism.

Climate change - Storm surge.

Wildfire.

### Opportunities (Field visits and local reports)

Opportunity for District Council of Streaky Bay, DEW, EP Landscape Board and private landholders to develop and implement coastal management plan addressing foreshore rehabilitation, revegetation, pest plant and animal control, access management, stormwater management and sand dune drift.

### Conservation Analysis (GIS)

The total of conservation means is 85.6, which is low for the region. Everywhere the cleared land gives low to very low totals, while the vegetated parts of the dunes have medium totals. The major contributors to this total are endemic floristic species (southern dunes), habitat for significant butterfly species (mainly in the southern dunes), viewscape and viewshed and vegetation patch metrics. Some values are added by threatened flora and fauna, total number of threatened species, species richness, bird habitat, reptile habitat, mammal habitat, and habitat for focal species Sea Eagle (southern part of cell), Beach Slider, and Bight Coast Skink (dunes). In conclusion, the largest area of medium conservation totals for those variables that contribute within this cell is the vegetated dunes of the southern end.

The 2019 review showed 15 new native flora species records and five additional weed species records since the 2011 analysis, with 35 flora species records by the 2019 review compared with 18 in the 2011 study. Three flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable).

The 2019 review showed five additional native fauna species records since the 2011 analysis with 31 fauna species records by the 2019 review compared with 27 in the 2011 study. Two of the new records included fauna species with a conservation rating, the Pacific Reef Heron (Eastern Reef Egret), *Egretta sacra*, rated rare under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Malleefowl, *Leipoa ocellata*, rated as vulnerable under the *National Parks and Wildlife Act 1972* (NPW Act) and under EPBC Act.

If the analysis were repeated for this cell, with only slight increases in flora species richness, the number of threatened bird species, and fauna species richness, this would still not be enough to raise the conservation rating of the cell to Medium. The rating would remain Low.

### Threat Analysis (GIS)

The total of threat means, 43.685, is a medium total for the region. The detailed pattern of threat totals is complex, but high totals are found around Haslam, across the width of the cell

## Cell Descriptions – EP 68 Haslam

immediately north of Keeley Beach, and on both sides of the Flinders Highway in the southern part of the cell. Off road vehicle pressure, land ownership and land use, viewshed and viewscape, and the presence of dangerous weeds are the major threats identified; dune instability, numbers of exotic species, and vegetation block shape also add to the threat total.

Current reports of the ongoing impact of ORV use (including speeding and fauna fatalities and quad bikes visiting sand dunes more), informal camping and encroachment outside of formal camping areas, pedestrian access and horse riding leading to track creation, vegetation destruction, dune erosion, disturbance of shorebirds.

The proximity to agriculture and grazing in the coastal reserves, exacerbates vegetation degradation, dune drift hazard and spread of weeds. There were five new weed species records identified in the 2019 data review, Onion Weed, *Asphodelus fistulosus*, which is a Declared weed and African Boxthorn, which is both a Declared and a Red Alert species. There is also a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains Medium.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility.	Active management of dunes; Consider possible retreat buffer zones for dunes; Re-zoning on land use and development plans needed.	
2070: +c.80cm	Dune instability and movement further increased; Pocket beaches below cliffs lost by sand removal to nearshore.		
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale;	2030: Occasional storm tide flooding above highest known tides; Damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	

## Cell Descriptions – EP 68 Haslam

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<i>Intensity</i> of large storms increases			
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain; Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage;  Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	NA		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes;  Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.79 Recommended Actions and Priority for EP 68 Haslam**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and saltmarshes.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High	DEW, EP Landscape Board
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, landowners, community groups, DC Lower Eyre Peninsula, EP Landscape Board, DEW, DPC
	Management of stock in the coastal zone.	Continue to work with private landowners to ensure that stock are restricted from the unallotted Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	High (cons/threat)	EP Landscape Board, landowners, DEW
	Management of environmental weeds namely African Boxthorn including garden escapees.	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants.	Medium (cons/threat)	DEW, EP Landscape Board, DC Streaky Bay, community
	ORV activity including horse riding is actively damaging vegetation and coastal landforms, leading to track creation, vegetation destruction, dune erosion and	Review existing tracks with view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or	High (cons/threat)	DEW, EP Landscape Board, community DC Streaky Bay Tourism SA

## Cell Descriptions – EP 68 Haslam

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
	disturbance of shorebirds.	are causing water run-off erosion. Install directional/ educational signage. Community education.		
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, firewood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage and maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/threat)	DEW, EP Landscape Board, community DC Streaky Bay Tourism SA
Water management and storm water runoff	Storm water impacts on coast and marine environment (e.g. pollution, rubbish, erosion, sediment movement).	Investigate the use of rain gardens and other water sensitive design to improve storm water runoff quality.	Medium (cons/threat)	DC Streaky Bay, EP Landscape Board
	Potential pollution or habitat degradation from increased nutrients from discharges.	Monitor impacts of marine discharge.	High (cons/threat)	EPA, PIRSA, DC Streaky Bay
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, DC Streaky Bay

## Cell Descriptions – EP 68 Haslam

<b>Component</b>	<b>Issue</b>	<b>Proposed Action</b>	<b>Priority of Action</b>	<b>Key Players</b>
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons/threat)	DEW, EP Landscape Board
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Medium (cons/threat)	EP Landscape Board, DC Streaky Bay, Private landowners, DEW
Dunes and clifftop dunes	As sea level rise accelerates, dunes with beach connection are increasingly affected by storm foredune damage, blowout development and weed invasion, leading to dune recession.	Active dune management. Maintain connectivity of vegetated areas.	Medium (cons/threat)	DEW, EP Landscape Board, Private landowners
	Gradual drying and increase in number of very hot days increases probability of fire.	Include dunes in regional fire plans.	Medium (threat)	DEW, EP Landscape Board, Private landowners, CFS, community
	Increasing aridity encourages grassy weed invasion of all dunes, including cliff top dunes.	Active dune management including weed control.	Medium (cons/threat)	DEW, EP Landscape Board
Beaches	Vehicles and dogs and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review boat launching locations with a view to rationalise.	Medium (cons/threat)	DEW, EP Landscape Board Tourism SA Private landowners, Bird Life Australia, community, PIRSA,



## Cell Descriptions – EP 68 Haslam

Component	Issue	Proposed Action	Priority of Action	Key Players
		Develop and implement specific shorebird management plans, include consideration to permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach/temporary fencing/dog free or dog on lease areas (include in Council Dog and Cat Management Plan). Undertake and support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.		EP LGA

### BIOTA

#### Flora

<b>Remnant vegetation area (ha)</b>	1269.66 ha (73.03% of the cell)
<b># flora surveys / records</b>	1 (0*) surveys, 1 (0*) opportune sites, (1*) threatened plant population flora record, 6 (4*) Herbarium records
<b># flora in cell</b>	35 (18*)
<b># conservation rated flora in cell</b>	1 (1*)
<b># non-indigenous flora in cell</b>	5 (3*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	22.94% of vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

#### Weeds

Species	Common Name	Status	Study rating
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avena sp.</i>	Oat		-
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Scabiosa atropurpurea</i>	Pincushion		-
<i>Sisymbrium sp.</i>	Wild Mustard		-

## Cell Descriptions – EP 68 Haslam

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia ancistrophylla</i> var. <i>lissophylla</i>	Hook-leaf Wattle		
<i>Acacia ligulata</i>	Umbrella Bush		
<i>Acacia oswaldii</i>	Umbrella Wattle		
<i>Acacia</i> sp. <i>Winged</i> (C.R. Alcock 4936)	Angled Wattle		
<i>Austrostipa scabra</i> ssp. <i>falcata</i>	Slender Spear-grass		
<i>Austrostipa</i> sp.	Spear-grass		
<i>Callitris gracilis</i>	Southern Cypress Pine		
<i>Carpobrotus</i> sp.	Pigface		
<i>Compositae</i> sp.	Daisy Family		
<i>Danthonia</i> sp. (NC)	Wallaby-grass		
<i>Dianella</i> sp.	Flax-lily		
<i>Diplocladia patersonis</i>			
<i>Dodonaea viscosa</i> ssp.	Sticky Hop-bush		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eucalyptus brachycalyx</i>	Gilja		
<i>Eucalyptus dumosa</i>	White Mallee		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Goodenia pusilliflora</i>	Small-flower Goodenia		
<i>Lomandra</i> sp.	Mat-rush		
<i>Microseris lanceolata</i>	Yam Daisy		
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia ciliata</i> var. <i>ciliata</i>	Fringed Daisy-bush		
<i>Prasophyllum catenemum</i>			E
<i>Rhagodia parabolica</i>	Mealy Saltbush		
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
<i>Senna artemisioides</i> ssp. <i>filifolia</i>	Fine-leaf Desert Senna		
<i>Suringariella harveyana</i>			
<i>Westringia dampieri</i>	Shore Westringia		
<i>Westringia rigida</i>	Stiff Westringia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	31 (27*) recorded – 31 (27*) birds, 0 (0*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 28 reptiles and 27 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 5 (2*) opportune sites
<b># of threatened fauna in cell</b>	4 (1*)
<b># of non-indigenous fauna</b>	3 (3*)

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Columba livia</i>	Feral Pigeon	Aves	

## Cell Descriptions – EP 68 Haslam

Species	Common Name	Class	Record
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Anas superciliosa</i>	Pacific Black Duck		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Eolophus roseicapilla</i>	Galah		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Larus pacificus</i>	Pacific Gull		
<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Smicronis brevirostris</i>	Weebill		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p

## Cell Descriptions – EP 68 Haslam

Species	Common Name	Status*	Record
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No mammal species recorded in 2011 or 2019 data.

### Reptiles

No reptile species recorded in 2011 or 2019 data.

### Amphibians

No amphibian species recorded in 2011 or 2019 data.

### Cell EP 72 Smoky Bay

Cell area 980 ha. Shoreline length 62.5 km (from the boundary of Laura Bay CP to Smoky Bay, including the township).



#### Landforms

This cell is a series of shallow, almost straight embayments between low calcarenite headlands, fronting a coastal plain of Pleistocene calcarenite, with a patchy cover of white and red dune sands. This 62 km long cell has its inner edge set by the default 500m boundary. The shore is mostly beaches and dunes; also low cliffs and bluffs (c.10m), with narrow cliff-top Holocene dunes fronted by narrow, steep, coarse sand beaches and cliff talus. Beaches north of Cap Dobouchage generally show few calcarenite bluffs, but are coarse sand steep beaches backed by dunes, showing evidence of recent de-stabilisation and recovery.

This is a sheltered coast, due to offshore reefs and Eyre Island. The shallow conditions with calcarenite reefs extend several kilometres offshore, and the low energy bay (including much of neighbouring cells EP71 and EP73) continues to accumulate large quantities of Holocene calcareous sediments.

#### Biota

Remnant vegetation covers 467 ha, 48% of this cell; 37% is coastal sand dunes. There is one flora survey site, three herbarium record sites and 17 opportune fauna survey sites. There are (usually narrow) dunes all along this cell: they are almost entirely vegetated and stable. The oblique aerial photographic record shows almost the entire coastal boundary was formerly low dune.

The dune vegetation is varied, including: *Eucalyptus gracilis* (mixed) mid mallee woodland over *Melaleuca lanceolata* (mixed) mid shrubs; *Melaleuca lanceolata*, *Geijera linearifolia* mid open shrubland over *Atriplex paludosa* ssp. *cordata* (mixed) low shrubs and *Carpobrotus rossii* (NC) low shrubs; and *Myoporum insulare* mid open shrubland over *Rhagodia crassifolia* (mixed) low shrubs and *Threlkeldia diffusa* (mixed) low shrubs.

#### Benthic Habitat

A shallow embayment. Narrow inshore sand flats and then seagrass, with low profile reef. Oyster racks offshore.



**FIGURE 6.84** Smoky Bay and surrounds. Photo: *Coast Protection Board, 2018.*

Land Use/Land Ownership

Far West Coast Native Title area.

Nuyts Archipelago Marine Park to c.3n.m.

There is Crown leasehold land near Cap Dobouchage, and a narrow reserve (30-50m<sup>2</sup>) of unalienated Crown land.

Uses (Field visits and local reports)

Township – Smoky Bay.

Agriculture – Cropping, grazing.

Commercial fishing – Cockling.

Aquaculture – Oysters.

Recreation & Tourism – Caravan park, shacks, sightseeing, nature, hiking, swimming, snorkelling, recreational fishing, camping (informal), dog walking, ORV (four-wheel drives, motorbikes), boating.

Boat launching – Beach, boat ramp.

Values (Field visits and local reports)

Conservation – important habitat for threatened fauna (Osprey).

Threats (Field visits and local reports)

Agriculture – Grazing.

Proximity to aquaculture.

Overfishing.

Pollution – Marine debris (fishing/aquaculture).

Uncontrolled access – Informal camping, ORV use – dune erosion.

Feral animals – Foxes, cats, rabbits.

## Cell Descriptions – EP 72 Smoky Bay

Weed infestation – Garden escapees.  
Future development – Residential, tourism.  
Climate change – Storm surge.

### Opportunities (Field visits and local reports)

Opportunity for District Council of Ceduna, DEW, EP Landscape Board and private landholders and community to continue their work on coastal revegetation and land management as well as develop and implement a coastal management plan addressing foreshore rehabilitation, revegetation, pest plant and animal control, access management, stormwater management and sand dune drift.

Long term beach profile survey records at Smoky Bay provide the opportunity to track and further understand coastal change due to sea level rise: this is not only of value in hazard assessment, but also in monitoring threat to conservation assets including dunes and beaches. [The location of the profiles can be checked on 'Naturemaps' SA. This record is a Coast Protection Board initiative, maintained by Coast and Marine Branch, DEW].

### Conservation Analysis (GIS)

The total of conservation means, 86.69, is low for the region. Cleared areas show low totals, while the dune shrublands and mallee woodlands record medium high totals. The major contributors to this total are threatened status of all fauna (recorded mainly near the inner boundary), endemic coastal dune species (medium high over all), habitat for threatened bird species and all existing bird species, habitat for White bellied Sea Eagle, viewscape and viewshed. Further, smaller, values are added by a number of small patches of endemic floristic vegetation, notably in inner dunes c.3km north of Smoky Bay; species richness; habitat for reptile species; habitat for significant butterfly species (dunes); habitat for Bight Skink and Beach Slider (focal species).

The 2019 review showed no new native flora species records but four additional weed species records since the 2011 analysis, with 29 flora species records by the 2019 review. This is lower than the 2011 analysis which included 38 records, which can be attributed to the 13 flora records that have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable).

The 2019 review showed nine additional native fauna species records since the 2011 analysis with 82 fauna species records by the 2019 review compared with the 2011 analysis. Seven records have been removed since the 2011 analysis from the BDBSA data update process. Two of the new records species have a conservation rating; Gilbert's Whistler, *Pachycephala inornate*, and Osprey, *Pandion haliaetus*, rated as endangered under the *National Parks and Wildlife Act*, 1972. If the analysis were repeated for this cell, the increases the number of threatened bird species, important habitat for threatened fauna (Osprey) including habitat priority based on Eastern Osprey nesting sites and distribution - focal species) and fauna species richness, would place this cell close to a conservation rating of Medium.

### Threat Analysis (GIS)

The total threat means of 49.208 is high for the region. The highest detailed totals are found at each end of the cell: within 3.5km of Smoky Bay and within 1.5 km of the boundary of Laura Bay CP; however, high threat totals are found all along the foredunes and cliff edges. Major contributors are ORV activity (dunes north of Smoky Bay), land ownership and land use, viewshed and viewscape, number of exotic species (widespread, except near Cap Dobouchage), and dangerous weeds (notably near Laura Bay CP, where African Boxthorn is recorded). Lesser



## Cell Descriptions – EP 72 Smoky Bay

totals are contributed by dune stability (many very small areas), development zoning and vegetation block metrics.

The high threat totals at the northern and southern ends of the cell are also areas of medium high conservation values and this is a signal for action.

Current reports of the ongoing impact of ORV and informal camping leading to further track creation, vegetation destruction and dune erosion. Grazing exacerbates cliff and dune erosion, vegetation degradation and spread of weeds. There were four new weed species records identified in the 2019 data review, including one Declared weed species, Lincoln Weed, *Diplotaxis tenuifolia*. There is also a need for ongoing resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains High.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach and bluff recession and dune instability in connected dunes, due to foredune damage.	Active management of dunes Consider possible retreat buffer zones for dunes. Re-zoning on land use and development plans needed.	
2070: +c.80cm	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore In the past cliff top dunes created by low cliff recession; this recession in soft calcarenite cliffs may be rapid following sea level rise, and a slight increase in wave energy, (in all beaches except the last bay north in the cell).		
<b>Storms:</b>	2030: Occasional storm tide flooding above	Continue to monitor shoreline movement	



## Cell Descriptions – EP 72 Smoky Bay

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<p><i>Frequency</i> continues to show great variation on a decadal scale</p> <p><i>Intensity</i> of large storms increases</p>	highest known tides; damage to foredunes.	Active management of dunes.	
<p><b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C</p>	Impacts uncertain; Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<p><b>Drier average conditions:</b> 2030: -2% to 5% 2070: -10% to 20%</p>	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses. Cliff top dunes, unaffected by foredune damage, also destabilised by aridity and weed invasion.	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.
<p><b>'Flashy' run off: Drier creeks, but larger rare floods</b></p>	NA		
<p><b>Groundwater lowering; saline incursion:</b></p>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite where natural assets could be threatened.
<p><b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to +1.5°C</p>	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.80 Recommended Actions and Priority for Cell EP72 Smoky Bay**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Ongoing and accelerating sea level beginning to cause change in dunes and soft calcarenite headlands.	Create a baseline for monitoring shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution. Maintain profile monitoring at vulnerable sites.	High (cons/threat)	DEW, EP Landscape Board  Coast Protection Board
	As sea level rise accelerates, dunes with beach connection are increasingly affected by storm foredune damage, blowout development and weed invasion, leading to dune recession.	Active dune management.	Medium (cons/threat)	EP Landscape Board, DEW
	Management of stock in the coastal zone.	Continue to work with private landowners to ensure that stock are restricted from the unalienated Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	High (cons/threat)	EP Landscape Board, landowners, DEW.
	Marine debris with potential impact on native fauna species.	Investigate opportunities for, and/or support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, etc.).	Medium (cons/threat)	PIRSA, EP Landscape Board, DEW, aquaculture operators, community, DC of Ceduna.
	ORV activity including horse riding and informal camping is applying strong pressure on the coastal reserves.	Rationalise tracks and camping points through consultation and local access control. Coastal management plans prepared and implemented with particular emphasis on foreshore rehabilitation, revegetation, pest plant	High (cons/threat)	DEW, EP Landscape Board, community DC Streaky Bay Tourism SA

## Cell Descriptions – EP 72 Smoky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
		and animal control, access control, and stormwater management.		
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons/threat)	DEW, EP Landscape Board
	Management of environmental weeds namely African Boxthorn including garden escapees.	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants.	Medium (cons/threat)	DEW, EP Landscape Board, DC Ceduna community
Dunes	Increasing aridity encourages grassy weed invasion of all dunes, including cliff top dunes.	Active dune management.	Medium (cons/threat)	EP Landscape Board
	Dunes c.3km of Smoky Bay show both high conservation total and high threat total.	Devise and implement an access and dune vegetation management plan.	High (cons/threat)	EP Landscape Board, landowners
	Dunes at northern end of cell have had reports of African Boxthorn invasion.	Implement noxious weed eradication plan in this area.	High (cons/threat)	EP Landscape Board landowners
Water management and storm water runoff	Storm water impacts on coast and marine environment (e.g. pollution, rubbish, erosion, sediment movement).	Investigate the use of rain gardens and other water sensitive design to improve storm water runoff quality.	Medium (cons/threat)	DC Streaky Bay, EP Landscape Board

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	467.07 ha (47.65% of the cell)
<b># flora surveys / records</b>	1 (3*) surveys, 0 (0*) opportune sites, 3 (1*) Herbarium record
<b># flora in cell</b>	29 (38*)
<b># conservation rated flora in cell</b>	0 (0*)
<b># non-indigenous flora in cell</b>	6 (15*)
<b>Significant CDCS floristic community</b>	<i>Melaleuca lanceolata</i> / <i>Atriplex paludosa</i> ssp. Shrubland – 96% of SA records in EP
<b>Protected area</b>	None of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

## Cell Descriptions – EP 72 Smoky Bay

### Weeds

Species	Common Name	Status	Study rating
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus rubens</i>	Red Brome		2
<i>Diplotaxis tenuifolia</i>	Lincoln Weed	D	3
<i>Limonium hyblaicum</i>			-
<i>Limonium sinuatum</i>	Notch-leaf Sea-lavender		3
<i>Matthiola incana</i>	Common Stock		-

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Atriplex paludosa</i> ssp. <i>cordata</i>	Marsh Saltbush		
<i>Austrostipa</i> sp.	Spear-grass		
<i>Carpobrotus rossii</i> (NC)	Native Pigface		
<i>Chrysocephalum apiculatum</i>	Common Everlasting		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eremophila deserti</i>	Turkey-bush		
<i>Eucalyptus dumosa</i> complex	White Mallee		
<i>Exocarpos syrticola</i>	Coast Cherry		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Gramineae</i> sp.	Grass Family		
<i>Hemichroa diandra</i>	Mallee Hemichroa		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia minor</i>	Heath Daisy-bush		
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Westringia rigida</i>	Stiff Westringia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	82 (80*) recorded – 81 (79*) birds, 1 (1*) reptile, 0 (0*) butterflies, 0 (0*) mammals, 0 (0*) amphibian (an additional 22 reptiles and 26 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 17 (10*) opportune sites
<b># of threatened fauna in cell</b>	7 (8*)

## Cell Descriptions – EP 72 Smoky Bay

**# of non-indigenous fauna**      4 (4\*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Turdus merula</i>	Common Blackbird	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grundl.

### Birds

Species	Common Name	Aus status	SA status
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
<i>Acanthiza apicalis</i>	Inland Thornbill		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata</i>	Red Wattlebird		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		
<i>Anthus australis</i>	Australian Pipit		
<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)		
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Ardea alba modesta</i>	Great Egret		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Barnardius zonarius</i>	Australian Ringneck		
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo		
<i>Cacomantis pallidus</i>	Pallid Cuckoo		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Certhionyx variegatus</i>	Pied Honeyeater		
<i>Chalcites basalus</i>	Horsfield's Bronze Cuckoo		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Cheramoeca leucosterna</i>	White-backed Swallow		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Circus assimilis</i>	Spotted Harrier		
<i>Colluricincla harmonica</i>	Grey Shrikethrush		
<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Coturnix pectoralis</i>	Stubble Quail		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Cygnus atratus</i>	Black Swan		

Cell Descriptions – EP 72 Smoky Bay

Species	Common Name	Aus status	SA status
<i>Daphoenositta chrysoptera</i>	Varied Sittella		
<i>Egretta garzetta</i>	Little Egret		R
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavicalis vireescens</i>	Singing Honeyeater		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Gymnorhina tibicen</i>	Australian Magpie		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus lamberti</i>	Variegated Fairywren		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Milvus migrans</i>	Black Kite		
<i>Morus serrator</i>	Australasian Gannet		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pachycephala inornata</i>	Gilbert's Whistler		R
<i>Pandion haliaetus</i>	Osprey		E
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Petrochelidon nigricans</i>	Tree Martin		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phaps chalcoptera</i>	Common Bronzewing		
<i>Platalea regia</i>	Royal Spoonbill		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Psephotellus varius</i>	Mulga Parrot		
<i>Rhipidura albiscapa</i>	Grey Fantail		
<i>Rhipidura leucobryis</i>	Willie Wagtail		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Smicromnis brevirostris</i>	Weebill		
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Vanellus miles</i>	Masked Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

## Cell Descriptions – EP 72 Smoky Bay

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

No terrestrial mammal species recorded in 2011 or 2019 data.

### Reptiles

Species	Common Name	Aus status	SA status	Record
<i>Pogona barbata</i>	Eastern Bearded Dragon			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

### Amphibians

No amphibian species recorded in 2011 or 2019 data.

**Cell EP 74 Thevenard/Ceduna**

Cell area 843 ha. Shoreline length 67.3 km.



Landforms

This cell is a low gently undulating coastal plain of degraded Pleistocene sands over limestone. The shoreline is sheltered, low energy, with pocket beaches and narrow connected dunes; elsewhere there are low cliffs, and small cliff top dunes. Beaches are composed of coarse shelly sands; at Bosanquet Bay the low dunes form a barrier blocking, in its eastern end, a low swamp of chenopod and samphire shrubs. Saline flats and samphire are also found in small more sheltered areas. Cape Vivonne and parts of the eastern shore of Bosanquet Bay show exposures of basement rocks in cliff bases and shore platforms: these rocks are Paleoproterozoic granite, adamellite, of the St Peter suite.

Benthic Habitat

Sandflats to c.200m., then patchy seagrass.

Biota

Remnant vegetation covers 344 ha - 41% of the cell; none is protected. There are 45 herbarium flora record sites and one flora survey site and 24 opportune fauna survey sites. *Acacia sp. Winged* (C.R.Alcock 4936)+/-*Olearia axillaris*+/-*Geijera linearifolia* mid open shrubland is recorded in the dunes backing the beach at Bosanquet Bay. Small cliff-top dunes on both sides of the bay record *Nitraria billardierei*+/-*Olearia axillaris* mid open shrubland. Nearer to Cape Vivonne *Melalenca lanceolata*, *Geijera linearifolia*+/-*Pittosporum angustifolium*+/-*Exocarpos aphyllus* mid open shrubland and *Atriplex cinerea*, *Olearia axillaris* low open shrubland appear.

Land Use/Land Ownership

Far West Coast Native Title area.

The majority of this cell is privately owned. There is a narrow coastal reserve of unalienated Crown land from Cape Vivonne to Cape Thevenard and north of Ceduna Hospital. The coastal



## Cell descriptions – EP 74 Thevenard/Ceduna

reserve from Cape Thevenard north to the Ceduna Hospital is Crown land under the care, control and management of the District Council of Ceduna. Nuyts Archipelago Marine Park offshore.



**Figure 6.85 Ceduna township. Photo: Coast Protection Board, 2018**

### Uses (Field Visits and Local Reports)

Township – Ceduna.

Industry – Port: Grain, gypsum, salt, mineral sands.

Conservation – Crown land strip.

Commercial fishing.

Recreation & Tourism – Caravan park, shacks, sightseeing, nature, hiking, swimming, snorkelling, recreational fishing, cockling, camping (formal), horse riding, dog walking, bootcamp training, ORV (four wheel drives, motorbikes), boating.

Boat launching – Beach, boat ramp.

### Threats (Field Visits and Local Reports)

Proximity to aquaculture.

Over fishing.

Pollution – Marine debris (fishing/aquaculture), rubbish and garden waste dumping.

Stormwater – Weed infestation.

Uncontrolled access – ORV use, track creation, samphire destruction.

Feral animals – Foxes, cats, rabbits.

Weed infestation – Garden escapees.

Future development – Residential, proposed marina, ecotourism ventures.

## Cell descriptions – EP 74 Thevenard/Ceduna

### Opportunities (Field Visits and Local Reports)

DEW records of surveyed beach profiles at Bosanquet Bay and the Ceduna foreshore (see locations on 'NatureMaps'), together with an accurate tide gauge record at Thevenard (National Tidal Office, Bureau of Meteorology) provide an excellent local record of sea level change and beach response.

Residents and Progress Associations, local businesses, schools and other community groups eg Murat Bay Scouts– Undertake actions to improve amenity and maintain and improve environmental value such as environmental weed control and revegetation.

Potential on-ground projects include education and monitoring – eg. Marine debris: community and schools to undertake clean-ups and provide data to EP Landscape Board.

Opportunity for District Council of Ceduna, DEW, EP Landscape Board and private landholders and community to develop and implement coastal management plan addressing foreshore rehabilitation, revegetation, pest plant and animal control, access management, stormwater management and sand dune drift.

### Conservation Analysis (GIS)

Low conservation value score of 89.23. Most developed areas within this cell record very low conservation values, while dune and low plateau remnant shrublands have medium to medium-high totals. The main conservation totals contributing to the conservation priority are Indigenous heritage, viewscape and viewshed analysis, number of threatened bird, reptile (dunes) and mammal species, species richness and threatened status of fauna. In addition there are contributions from: endemic floristic vegetation (notably at Cape Vivonne and in the dunes backing Bosanquet Bay), number of bird species, and habitat for focal species (Eastern Osprey and White-bellied Sea Eagle). In summary, development has ensured a low total for this cell, but very significant small areas of valuable habitat remain, notably in the mangrove and saltmarsh in the northern corner of Bosanquet Bay, and in the dunes in the NE and E of Bosanquet Bay.

The 2019 review showed 11 new native flora species records and 16 additional weed species records since the 2011 analysis, with 106 flora species records by the 2019 review compared with 93 in the 2011 study. 13 flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review showed eight additional native fauna species records since the 2011 analysis with 64 fauna species records by the 2019 review. While the total number of records is unchanged from the 2011 study, 4 fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). Two of the new records included fauna species with a conservation rating, the Peregrine Falcon, *Falco peregrinus* and Kelp Gull, *Larus dominicanus dominicanus*, rated rare under the National Parks and Wildlife Act 1972. If the analysis were repeated for this cell, increases in flora species richness, the number of threatened bird species, and fauna species richness, may just be enough to raise the conservation rating of the cell to Medium.

### Threat Analysis (GIS)

The total of threat means, 59.452, is high for the region: the detailed map of these totals shows less than 5% of the cell with a total below average. Several variables make contribution to this total: ORV activity (throughout), number of exotic species, dangerous weeds (all areas affected but dunes backing Shelly Beach are seriously threatened), land use, land ownership (dunes, mangrove and saltmarsh affected), development zoning (although valuable conservation areas are not affected), existing development, viewshed and viewscape.

## Cell descriptions – EP 74 Thevenard/Ceduna

Ongoing impact of ORVs leading to further track creation, spread of weeds and vegetation destruction including disturbance to samphire communities. There were 16 new weed species records identified in the 2019 data review. Five of the new weed records include Declared species - Buffel Grass, Fountain Grass, Bathurst Burr, Gazania and Silver-leaf Nightshade, as well as red alert species - Common Iceplant. A number of the new weed species were not recorded within the Eyre Peninsula region at the time of the 2011 study and therefore have not been allocated a study threat rating. The study threat rating for the Declared and Red Alert species in particular would have been relatively high, this may have increased the threat rating of the cell. There is also a need for ongoing resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. The threat rating remains High.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution. Access tidal data (National Tidal Office web site) and beach profile records to monitor local change.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility; Tide-dependant small mangrove and saltmarsh areas threatened by changes in inundation frequency and duration.	Continue to monitor existing DEW beach profiles (33003-7); Active management of dunes; Consider possible retreat buffer zones for dunes and saltmarsh. Re-zoning on land use and development plans may be needed.	
2070: +c.80cm	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore.		

Cell descriptions – EP 74 Thevenard/Ceduna

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<p><b>Storms:</b>  <i>Frequency</i> continues to show great variation on a decadal scale</p>	<p>2030: Occasional storm tide flooding above highest known tides; damage to foredunes.</p>	<p>Continue to monitor beach profiles. Active management of dunes.</p>	
<p><i>Intensity</i> of large storms increases</p>			
<p><b>Warmer average conditions:</b>            2030: +0.3 to 0.6°C            2070: +1.5 to 2°C</p>	<p>Impacts uncertain - Existing terrestrial vegetation is found in warmer conditions elsewhere. Invasive species may become more dominant.</p>		<p>Maintain connectivity of vegetation within the coastal boundary.</p>
<p><b>Drier average conditions:</b>            2030: -2% to 5%            2070: -10% to 20%</p>	<p>Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage; Opportunity created for more frequent weed invasion, notably of dune grasses.</p>	<p>Active dune management, including weed control.</p>	<p>Ensure that coastal vegetation blocks are part of the regional fire plan.</p>
<p><b>'Flashy' run off:</b>            Drier creeks, but larger rare floods</p>	<p>N/A</p>		
<p><b>Groundwater lowering; saline incursion:</b></p>	<p>Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival.</p>	<p>Adaptive management of plant assets.</p>	<p>Monitor level and salinity of water table within the calcarenite.</p>
<p><b>Nearshore sea changes - temperature; acidity; wave climate:</b>            2030: +0.3°C to +0.6°C            2070: +1.0°C to +1.5°C</p>	<p>Persistent swell wave climate maintains sediment movement.</p>		

**TABLE 6.81 Recommended Actions and Priority for EP74 Ceduna/Thevenard**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Marine debris with potential impact on native fauna species.	Support continuation of marine debris surveys; Use information from surveys to develop and implement education program targeting source of debris (e.g. professional or recreational fishers, campers, aquaculture operators, community and schools, Scout Group etc.).	Medium (cons/threat)	EP Landscape Board, PIRSA, DEW, aquaculture operators, DC Ceduna, community
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, land owners, community groups, DC Ceduna, EP Landscape Board, DEW, DPC
	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DEW, EP Landscape Board
	Management of environmental weeds including garden escapees and garden waste dumping.	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required. Undertake education program on impact of garden escape plants and garden waste dumping.	Medium (cons/threat)	EP Landscape Board, DEW, DC Ceduna, land owners, community
	Storm water impacts on coast and marine environment (e.g. weeds, pollution, rubbish, erosion, sediment movement).	Implement stormwater management plan for Ceduna.	Medium (cons/threat)	DC Ceduna, EP Landscape Board
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate	Medium (cons/ threat)	Private land owners, DC of Ceduna, DIT, DEW, EP Landscape Board, community

## Cell descriptions – EP 74 Thevenard/Ceduna

Component	Issue	Proposed Action	Priority of Action	Key Players
	introduction, dune instability, disturbance to native fauna species	(where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing erosion. Install directional /educational signage. Community education		
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Low	EP Landscape Board, DEW, DC of Ceduna, private land owners
	Rising sea level increases saline groundwater pressure.	Monitor groundwater for salinity levels to manage plant and soil assets.	Low (cons/threat)	DEW, EP Landscape Board
	Areas within cell identified as having conservation values, little or no protection and impact from recreational activities and land management practices, particularly the dunes at the back of Shelly Beach.	Develop and implement coastal management plans in collaboration with all key players, investigate and implement actions to improve, protect and mitigate threats to these areas eg. access management – pedestrian and vehicle, dune and saltmarsh/mangrove management, community education, pest animal and plant control. Install interpretive / educational signage. Community projects and education eg. shorebird monitoring program.	Medium (cons/ threat)	DEW, EP Landscape Board, DC of Ceduna, community, local schools, land owners
	Existing and possible future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc).	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming	Medium (cons/ threat)	EP Landscape Board, DC of Ceduna, DEW, AGD-PLUS, private land owners, community groups

## Cell descriptions – EP 74 Thevenard/Ceduna

Component	Issue	Proposed Action	Priority of Action	Key Players
		weeds, impacts of uncontrolled dogs and cats, etc.		
Mangrove and saltmarsh in northern corner of Bosanquet Bay	This small area contains valuable plant and animal habitats, but is threatened by adjacent industrial and residential development and associated runoff and traffic.	Develop interpretive signage to raise awareness of the values of the area.  Review access by vehicles and pedestrians. Upgrade any tracks that are not well defined, or are causing water run-off or erosion. Install directional and educational signage. Community education.	Medium (cons/threat)	EP Landscape Board DC Ceduna
	All saltmarsh areas show the potential for coastal acid sulfate soils following disturbance; in turn this would potentially threaten life forms within the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (cons/threat)	DEW, EP Landscape Board, DC Ceduna Developers and private landholders
Beaches and dunes	Accelerating sea level rise and climate change leading to beach and dune recession, dune instability and grassy weed invasion.	Maintain beach profile monitoring Active dune management including weed control. Maintain connectivity of vegetated areas.	Medium (cons/threat)	DEW, EP Landscape Board, DC Ceduna, community

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	343.51 ha (40.76% of the cell)
<b># flora surveys / records</b>	1 (0*) surveys, 0 (0*) opportune sites, 45 (7*) Herbarium records
<b># flora in cell</b>	106 (93*)
<b># conservation rated flora in cell</b>	5 (5*)
<b># non-indigenous flora in cell</b>	26 (18*)
<b>Significant CDCS floristic community</b>	None
<b>Protected area</b>	None of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

Cell descriptions – EP 74 Thevenard/Ceduna

Weeds

Species	Common Name	Status	Study rating
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avena barbata</i>	Bearded Oat		2
<i>Avena sativa</i>	Cultivated Oat		2
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bupleurum semicompositum</i>	Hare's Ear		0
<i>Cakile maritima ssp. maritima</i>	Two-horned Sea Rocket		1
<i>Cenchrus ciliaris</i>	Buffel Grass	D	-
<i>Cenchrus setaceus</i>	Fountain Grass	D	-
<i>Conyza bonariensis</i>	Flax-leaf Fleabane		0
<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill		0
<i>Gazania sp.</i>	Gazania	D	6
<i>Iberis crenata</i>	Candytuft		0
<i>Lolium perenne</i>	Perennial Ryegrass		1
<i>Marrubium vulgare</i>	Horehound	D, RA	5
<i>Mesembryanthemum aitonis</i>	Angled Iceplant		-
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Rostraria cristata</i>	Annual Cat's-tail		2
<i>Rostraria pumila</i>	Tiny Bristle-grass		2
<i>Setaria verticillata</i>	Whorled Pigeon-grass		-
<i>Silene nocturna</i>	Mediterranean Catchfly		1
<i>Sisymbrium irio</i>	London Mustard		-
<i>Solanum elaeagnifolium</i>	Silver-leaf Nightshade	D	2
<i>Spergularia diandra</i>	Lesser Sand-spurrey		-
<i>Sporobolus africanus</i>	Rat-tail Grass		-
<i>Xanthium spinosum</i>	Bathurst Burr	D	-

D: Declared weed, RA: Red alert weed  
Blue = recorded in 2019, new since 2011

Native flora

Species	Common Name	Aus status	SA status
<i>Acacia oswaldii</i>	Umbrella Wattle		
<i>Allocasuarina helmsii</i>	Helm's Oak-bush		
<i>Angianthus tomentosus</i>	Hairy Angianthus		
<i>Atriplex cinerea</i>	Coast Saltbush		
<i>Atriplex paludosa ssp. cordata</i>	Marsh Saltbush		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Austrostipa drummondii</i>	Cottony Spear-grass		
<i>Austrostipa eremophila</i>	Rusty Spear-grass		
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Austrostipa nitida</i>	Balcarra Spear-grass		
<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass		
<i>Austrostipa plumigera</i>			R



Cell descriptions – EP 74 Thevenard/Ceduna

Species	Common Name	Aus status	SA status
<i>Austrostipa</i> sp.	Spear-grass		
<i>Beyeria lechenaultii</i>	Pale Turpentine Bush		
<i>Brachyscome lineariloba</i>	Hard-head Daisy		
<i>Brachyscome trachycarpa</i>	Smooth Daisy		
<i>Bromus arenarius</i>	Sand Brome		
<i>Caulerpa cactoides</i>			
<i>Caulocystis uvifera</i>			
<i>Cladophoropsis herpestica</i>			
<i>Comesperma volubile</i>	Love Creeper		
<i>Cratystylis conocephala</i>	Bluebush Daisy		
<i>Cystoseira trinodis</i>			
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Dodonaea stenozyga</i>	Desert Hop-bush		
<i>Eremophila deserti</i>	Turkey-bush		
<i>Eremophila glabra</i> ssp. <i>glabra</i>	Tar Bush		
<i>Eremophila rotundifolia</i>	Round-leaf Emubush		
<i>Eremophila scoparia</i>	Broom Emubush		
<i>Eremophila subfloccosa</i> ssp. <i>lanata</i>	Woolly Emubush		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Goodenia varia</i>	Sticky Goodenia		
<i>Helichrysum leucopsideum</i>	Satin Everlasting		
<i>Lawrenzia glomerata</i>	Clustered Lawrenzia		
<i>Lawrenzia squamata</i>	Thorny Lawrenzia		
<i>Leiocarpa pluriseta</i>			R
<i>Lepidosperma carphoides</i>	Black Rapier-sedge		
<i>Leptorhynchos waitzia</i>	Button Immortelle		
<i>Lomandra collina</i>	Sand Mat-rush		
<i>Maireana brevifolia</i>	Short-leaf Bluebush		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Maireana oppositifolia</i>	Salt Bluebush		
<i>Maireana trichoptera</i>	Hairy-fruit Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca pauperiflora</i> ssp. <i>mutica</i>	Boree		
<i>Nicotiana goodspeedii</i>	Small-flower Tobacco		
<i>Nitraria billardierei</i>	Nitre-bush		
<i>Olearia exiguifolia</i>	Lobed-leaf Daisy-bush		
<i>Olearia magniflora</i>	Splendid Daisy-bush		
<i>Olearia minor</i>	Heath Daisy-bush		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Plantago drummondii</i>	Dark Plantain		
<i>Poa drummondiana</i>	Knotted Poa		R
<i>Prasophyllum catenemum</i>			E
<i>Ptilotus obovatus</i>	Silver Mulla Mulla		
<i>Ralfsia verrucosa</i>			
<i>Rhagodia crassifolia</i>	Fleshy Saltbush		
<i>Rhagodia spinescens</i>	Spiny Saltbush		
<i>Rhodanthe haigii</i>	Haig's Everlasting		
<i>Rhodanthe pygmaea</i>	Pigmy Daisy		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Scaevola myrtifolia</i>	Myrtle Fanflower		R
<i>Sclerolaena brevifolia</i>	Small-leaf Bindyi		

## Cell descriptions – EP 74 Thevenard/Ceduna

Species	Common Name	Aus status	SA status
<i>Scerolaena uniflora</i>	Small-spine Bindyi		
<i>Senecio spanomerus</i>			
<i>Senna artemisioides</i> ssp. <i>petiolaris</i>			
<i>Solanum hystrix</i>	Afghan Thistle		
<i>Sphacelaria fusca</i>			
<i>Sphacelaria rigidula</i>			
<i>Spyridium phyllicoides</i>	Narrow-leaf Spyridium		
<i>Suaeda australis</i>	Austral Seablite		
<i>Templetonia retusa</i>	Cockies Tongue		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Trichanthodium skirrophorum</i>	Woolly Yellow-heads		
<i>Vittadinia australasica</i> var. <i>australasica</i>	Sticky New Holland Daisy		
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy		
<i>Vittadinia megacephala</i>	Giant New Holland Daisy		
<i>Westringia dampieri</i>	Shore Westringia		
<i>Westringia rigida</i>	Stiff Westringia		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	64 (64*) recorded – 60 (60*) birds, 3 (4*) reptile, (0*) butterflies, 1 (0*) mammals, 1 (1*) amphibian (an additional 22 reptiles and 26 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 24 (17*) opportune sites
<b># of threatened fauna in cell</b>	11 (11*)
<b># of non-indigenous fauna</b>	3 (3*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Columba livia</i>	Feral Pigeon	Aves	
<i>Passer domesticus</i>	House Sparrow	Aves	
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas gracilis</i>	Grey Teal		
<i>Anthochaera carunculata woodwardi</i>	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)		

Cell descriptions – EP 74 Thevenard/Ceduna

Species	Common Name	Aus status	SA status
<i>Apus pacificus</i>	Pacific Swift (Fork-tailed Swift)		
<i>Ardea alba modesta</i>	Great Egret		
<i>Arenaria interpres</i>	Ruddy Turnstone		R
<i>Artamus cyanopterus</i>	Dusky Woodswallow		
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chlidonias hybrida</i>	Whiskered Tern		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Corvus coronoides</i>	Australian Raven		
<i>Cracticus torquatus</i>	Grey Butcherbird		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Egretta sacra</i>	Pacific Reef Heron (Eastern Reef Egret)		R
<i>Elanus axillaris</i>	Black-shouldered Kite		
<i>Eolophus roseicapilla</i>	Galah		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Falco peregrinus</i>	Peregrine Falcon		R
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Grallina cyanoleuca</i>	Magpielark		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		E
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Hydroprogne caspia</i>	Caspian Tern		
<i>Larus dominicanus dominicanus</i>	Kelp Gull		R
<i>Larus pacificus</i>	Pacific Gull		
<i>Manorina flavigula</i>	Yellow-throated Miner	ssp	ssp
<i>Megalurus cruralis</i>	Brown Songlark		
<i>Merops ornatus</i>	Rainbow Bee-eater		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pachyptila belcheri</i>	Slender-billed Prion		
<i>Pandion haliaetus</i>	Osprey		E
<i>Pardalotus striatus</i>	Striated Pardalote		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Smicromis brevirostris</i>	Weebill		
<i>Thalassus bergii</i>	Greater Crested Tern		
<i>Todiramphus pyrrohopygius</i>	Red-backed Kingfisher		
<i>Tringa brevipes</i>	Grey-tailed Tattler		R
<i>Tringa nebularia</i>	Common Greenshank		
<i>Tringa stagnatilis</i>	Marsh Sandpiper		
<i>Vanellus miles</i>	Masked Lapwing		

Cell descriptions – EP 74 Thevenard/Ceduna

Species	Common Name	Aus status	SA status
<i>Vanellus tricolor</i>	Banded Lapwing		
<i>Zosterops lateralis</i>	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

### Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingha trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java tentonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides beathi beathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

### Mammals

Species	Common Name	Aus status	SA status
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal (New Zealand Fur Seal)		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
 Blue = recorded in 2019, new since 2011

## Reptiles

No new reptile species records since 2011.

Species	Common Name	Aus status	SA status	Record
<i>Chelonia mydas</i>	Green Sea Turtle	VU	V	
<i>Diplodactylus calcicolus</i>	South Coast Stone Gecko			
<i>Pseudonaja affinis</i>	Dugite			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

## Amphibians

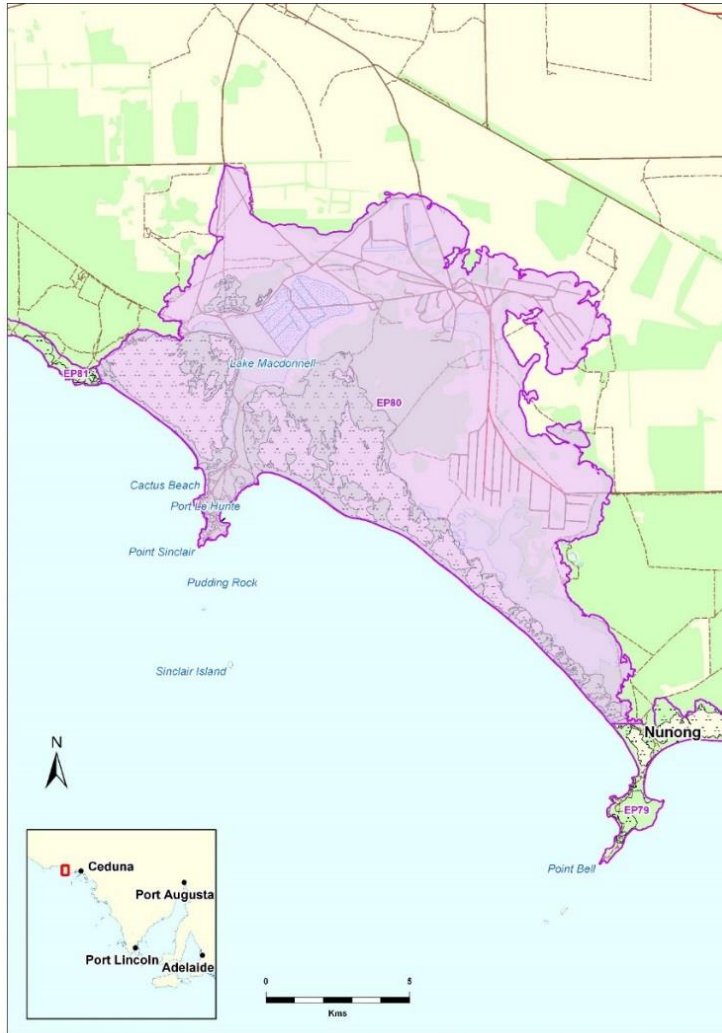
No new amphibian species records since 2011.

Species	Common Name	Aus status	SA status
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

**Cell EP 80 Point Sinclair**

Cell area 16,235 ha. Shoreline length 156.3 km.



Landforms

This large cell shows huge unstable Holocene dune fields, with seasonal saline lakes (Lake Macdonnell) on the back barrier flats. Both dunes and flats narrow towards Point Bell. The dunes are currently transgressing into earlier Holocene dunefields and the backbarrier lagoon sequence; there appear to have been at least two previous episodes of transgressive dune activity.

Point Sinclair is a prominent bedrock headland with shore platforms, and some vertical cliffs. The fine-medium sand beaches are moderate energy reflective, varying locally with nearshore reefs, but almost entirely backed by unstable dunes.

Benthic Habitat

There are extensive inshore reefs and bare sand along the entire cell.

Biota

Remnant vegetation covers 5811 ha - 36% of the cell. 92 % of vegetation is not protected. There are 17 herbarium flora record sites, three flora survey sites, two opportune flora survey sites and 19 opportune fauna survey sites. The vegetated dunes have extensive *Myoporum insulare* +/- *Olearia axillaris* mid open shrubland. *Nitraria billardierei*, *Olearia axillaris*, +/- *Atriplex cinerea*, +/- *Myoporum insulare* mid open shrubland over *Threlkeldia diffusa*, +/- *Tetragonia implexicoma*, +/- *Atriplex paludosa ssp. cordata* low shrubland. The back barrier flats are mainly bare saltflats, but include *Tecticornia halocnemoides ssp.*, +/- *Maireana oppositifolia*, +/- *Lawrencia squamata*, +/- *Tecticornia indica ssp.* low open shrubland over +/- *Disphyma crassifolium ssp. clavellatum*, +/- *Frankenia sp.* Also *Tecticornia sp.*, *Atriplex vesicaria ssp.* low open shrubland over +/- *Hemichroa diandra*, +/- *Maireana oppositifolia*. Slopes on Point Sinclair include *Melaleuca lanceolata*, *Geijera linearifolia*, +/- *Pittosporum angustifolium*, +/- *Exocarpos aphyllus* mid open shrubland over +/- *Atriplex paludosa ssp. cordata*, +/- *Rhagodia crassifolia*, +/- *Atriplex vesicaria ssp.* low shrubs over +/- *Carpobrotus rossii* (NC), +/- *Threlkeldia diffusa*, +/- *Frankenia sessilis*.





**Figure 6.86 Point Sinclair. Photo: Coast Protection Board, 2018.**

Land Use/Land Ownership

Far West Coast Native Title area.

The dunes and the SE flats are Crown leasehold land (in part used as saltpans); the northerly parts of the flats, including Lake MacDonnell, are unalienated Crown land.

The cell also comprises part of Chadinga Conservation Park.

Nuyts Archipelago Marine Park is offshore.

Uses (Field Visits and Local Reports)

Conservation – Chadinga Conservation Reserve contains a relatively undisturbed coastal dune system with an associated samphire community and mallee woodland, providing important habitat for the Spinifex Hopping Mouse, Short-beaked Echidna and numerous bird species; Nuyts Archipelago Marine Park offshore.

Mining – Gypsum at Lake Macdonnell.

Commercial fishing – Shark, Rock Lobster, Abalone, A-Class fishing.

Recreation and Tourism – Cactus Beach campground, shacks, sightseeing, nature, hiking, boating, swimming, surfing, snorkelling, recreational fishing, camping (formal and informal), dog walking, scuba diving, ORV use (motorbikes, four wheel drives).

Boat launching from beach.

Values (Field Visits and Local Reports)

Conservation – Habitat for threatened fauna (Osprey, Australian Sea lion).

Point Sinclair is listed in the marine park description as a significant whale resting site.

Threats (Field Visits and Local Reports)

Industry - Mining at Lake Macdonnell.

ORV use.

## Cell descriptions – EP 80 Point Sinclair

Uncontrolled access – Informal camping, destruction of samphire and dune vegetation, disturbance of shorebird habitat.

Feral animals – Foxes, cats, rabbits.

Weed infestation.

Future development – Tourism ventures.

Potential Coastal Acid Sulfate Soils.

### Opportunities (Field Visits and Local Reports)

Opportunity to develop and implement coastal management plans in collaboration with landholders, EP Landscape Board and community with particular focus on addressing pest plant and animal control, access management, inland flooding hazard and dune drift.

Increase emphasis and education around pest plant control (Caltrop).

Potential re-vegetation and weed control with Residents Association (Penong Residents) and Community Group (Surfing Reserve).

Potential on-ground projects include shorebird monitoring with school (Penong School) or community.

### Conservation Analysis (GIS)

The total of conservation means, 92.03, is low for the region. The detailed map of total conservation values shows clear contrasts between the broad land systems: medium to medium high values are found on the dune shrubland; low values characterise the back-barrier flats and the de-vegetated dunes. The major contributors to the conservation total include: rarity of coastal dune plant associations, threatened status of flora, endemic dune plant associations, habitat for threatened mammal species, and indigenous heritage. Significant value is also added by: threatened status of fauna, total number of threatened species, species richness, Eastern Osprey nesting site, habitat for Beach Slider and Bight Coast Skink and Viewscape Analysis.

The 2019 review showed three new native flora species records and no new weed species records since the 2011 analysis, with 110 flora species records by the 2019 review compared with 118 in 2011. Eleven flora records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). The 2019 review also showed three additional native fauna species records since the 2011 analysis with 54 fauna species records by the 2019 review compared with 53 in 2011. Two fauna records have been removed since the 2011 analysis from the BDBSA data update process (e.g. they may have been considered unreliable). One of the new fauna records include a species with a conservation rating (excluding ssp) the Australian Bustard, *Ardeotis australis*, listed as vulnerable under the *National Parks and Wildlife Act 1972*. If the analysis were repeated for this cell, these changes may just be enough to raise the conservation rating of the cell to Medium.

### Threat Analysis (GIS)

The total of threat means, 48.211, is high for the region. Threat totals are very high on the inland edges of the back-barrier flats and high to medium on the nearshore dunes; some near-dune flats emerge as low threat. The extent of ORV impact on the back-barrier flats and near Cactus Beach and Point Sinclair give the highest total in this category for the region; development zoning, land ownership and land use, viewscape, mining, vegetation block degradation, dangerous weeds, and dune instability add to a considerable threat total.

Ongoing reports of the impact of ORV and informal camping leading to destruction of samphire and dune vegetation, disturbance of shorebird habitat. Though there were no new weed species records identified in the 2019 data review, there is a need for increased control of weed



## Cell descriptions – EP 80 Point Sinclair

infestations with emphasis and education around pest plant control (Caltrop). There is a need for more resources for feral animal control eg. reported ongoing feral cat, rabbits and fox populations and the threat they pose to native wildlife and the coastal landscape. There is also the additional pressure from ongoing Gypsum mining and potential expansion of mining ventures. The threat rating remains High.

### Adaptation to Climate Change Threats

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning; however, there are strategic implications for planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
<b>Combined climate changes and sea level rise throughout this cell</b>	This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
<b>Sea level rise:</b> 2030: +c.20cm	Beach recession and dune instability due to foredune damage; Increase in dune mobility.	Active management of dunes; Consider possible retreat buffer zones for dunes. Re-zoning land use and development plans may be needed.	
2070: +c.80cm	Dune instability and movement further increased transgression into the backbarrier lagoon sequence.	Dune management and accommodation of retreat continue.	
<b>Storms:</b> <i>Frequency</i> continues to show great variation on a decadal scale	2030: Occasional storm tide flooding above highest known tides; damage to foredunes.	Continue to monitor shoreline movement; Active management of dunes.	
<i>Intensity</i> of large storms increases			
<b>Warmer average conditions:</b> 2030: +0.3 to 0.6°C 2070: +1.5 to 2°C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere.		Maintain connectivity of vegetation within the coastal boundary.
<b>Drier average conditions:</b> 2030: -2% to 5%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm	Active dune management, including weed control.	Ensure that coastal vegetation blocks are part of the regional fire plan.

## Cell descriptions – EP 80 Point Sinclair

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: -10% to 20%	damage; Opportunity created for more frequent weed invasion, notably of dune grasses.		
<b>'Flashy' run off:</b> Drier creeks, but larger rare floods	N/A		
<b>Groundwater lowering; saline incursion:</b>	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes; Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival in back barrier lowlands.	Adaptive management of plant assets.	Monitor level and salinity of water table within the calcarenite.
<b>Nearshore sea changes - temperature; acidity; wave climate:</b> 2030: +0.3°C to +0.6°C 2070: +1.0°C to + 1.5°C	Persistent swell wave climate maintains sediment movement.		

**TABLE 6.82 Recommended Actions and Priority for EP80 Pt Sinclair**

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna including pest flora and fauna reports that are not recorded in surveys.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DEW, EP Landscape Board
	Climate change and ongoing and accelerating sea level beginning to cause change in dunes and saltmarsh.	Create a baseline for monitoring shoreline, dune and saltmarsh change by establishing a rectified aerial photographic record at an appropriate resolution	Medium	DEW, EP Landscape Board

## Cell descriptions – EP 80 Point Sinclair

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species.	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain.  Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education.	High (cons/threat)	DEW, EP Landscape Board, private land owners, mine operator, Tourism SA
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes and cats. Undertake a control program if required. Work with private land owners to ensure that stock are restricted from areas of high conservation value and/or sensitive features (eg. clifftop dunes) eg. ensure fences are adequate and maintained.	Medium (threat)	EP Landscape Board, DEW, private land owners
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, firewood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage and maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/threat)	DEW, EP Landscape Board, community, Tourism SA
	Invasive weed species identified throughout cell.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/threat)	EP Landscape Board, DEW, private land owners, community

## Cell descriptions – EP 80 Point Sinclair

Component	Issue	Proposed Action	Priority of Action	Key Players
		Undertake education program on impact of garden escape plants and weed control program with Penong Residents Association and Community Group (Surfing Reserve).		
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons/threat)	DEW, EP Landscape Board, private land owner, community
	Mining and production leases occur across much of this cell, with potential impact on sensitive areas and conservation values.	Ensure rehabilitation of disused sites before expansion of new sites. Ensure any areas of expansion avoid areas of high conservation values. Investigate / consider removal of tenements from high conservation areas.	Medium (cons/threat)	DEM, DEW, land owners / lease holders
	Possible future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, discharges to sensitive marine environment, etc)	Ensure future development is not located in areas of high conservation value or high sensitivity. Ensure future development minimises impact to surrounding environment (eg. limit track creation, limit development footprint, prohibit/minimise discharges to the marine environment). Review development zoning to ensure appropriate protection. Community education about impacts, eg. regarding garden plants	High (cons/threat)	DEW, AGD-PLUS, EP Landscape Board, private land owners, developers, community groups

## Cell descriptions – EP 80 Point Sinclair

Component	Issue	Proposed Action	Priority of Action	Key Players
		becoming weeds, impacts of uncontrolled pets, etc		
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites; Consultation to appropriately manage sites where required.	High (cons/threat)	Traditional owners, land owners, community groups, EP Landscape Board, DEW, DPC
	Areas within cell identified as having medium to high conservation values, little or no protection and impact from recreational activities and land management practices.	Develop and implement coastal management plans in collaboration with all key players, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, access management, dune management, pest animal and plant control. Install interpretive / educational signage. Community projects and education eg. shorebird monitoring program with local community and Penong School.	Medium (cons/threat)	DEW, EP Landscape Board, community, local school, land owners
Dunes	The main conservation values for this cell are in the dune shrublands which are threatened by ORV activity, weeds and the transgressive nature of the dune system.	The scale of the existing de-stabilisation of the dunes make extensive planting impractical; some local areas may be managed by access/ weed control and plantings.	Medium (cons/threat)	DEW, EP Landscape Board, community, land owners
	Climate change threatens to destabilise through foredune damage, increased weed invasion and aridity slowing recovery from damage by storm or fire.	Active dune management where locally feasible to stabilise dunes, weed and pest control: for example near Cactus Beach.	Medium (cons/threat)	EP Landscape Board, DEW, land owners, community
Back-barrier lowlands	Rising sea level increases saline groundwater pressure.	Monitor ground water for salinity levels to manage plant and soil assets.	Medium (cons/threat)	DEW, EP Landscape Board

## Cell descriptions – EP 80 Point Sinclair

Component	Issue	Proposed Action	Priority of Action	Key Players
Beaches and back-barrier lowlands	Habitat for birds of conservation significance with potential for disturbance from people, vehicles, dogs and pest animals.	Review and rationalise tracks. Develop and implement specific shorebird management plans, including consideration of various permanent, temporary or seasonal closures. Undertake and support shorebird monitoring programs with Penong School and local community. Raising community awareness through interpretive signage and other programs.	Medium (cons/threat)	DEW, EP Landscape Board, Birdlife Australia, land owners, community, Tourism SA

## BIOTA

### Flora

<b>Remnant vegetation area (ha)</b>	5810.97 ha (35.79% of the cell)
<b># flora surveys / records</b>	3 (7*) surveys, 2 (1*) opportune site, 17 (15*) Herbarium records
<b># flora in cell</b>	110 (118*)
<b># conservation rated flora in cell</b>	5 (5*)
<b># non-indigenous flora in cell</b>	19 (21*)
<b>Significant CDCS floristic community</b>	<i>Cakile maritima</i> ssp. <i>maritima</i> herbland – 25% of SA records in EP <i>Melaleuca lanceolata</i> / <i>Atriplex paludosa</i> ssp. Shrubland – 96% of SA records in EP <i>Melaleuca lanceolata</i> / <i>Senecio lautus</i> shrubland – 97% of SA records in EP <i>Olearia axillaris</i> / <i>Tetragonia implexicoma</i> shrubland – 76% of SA records in EP
<b>Protected area</b>	6.98% of the vegetation in the cell is protected

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Weeds

Species	Common Name	Status	Study rating
<i>Arctotheca populifolia</i>	Beach Daisy	RA	7
<i>Asphodelus fistulosus</i>	Onion Weed	D	3
<i>Avena barbata</i>	Bearded Oat		2

## Cell descriptions – EP 80 Point Sinclair

Species	Common Name	Status	Study rating
<i>Brassica tournefortii</i>	Wild Turnip		3
<i>Bromus rubens</i>	Red Brome		2
<i>Bupleurum semicompositum</i>	Hare's Ear		0
<i>Centaurea melitensis</i>	Malta Thistle		1
<i>Chenopodium murale</i>	Nettle-leaf Goosefoot		0
<i>Euphorbia paralias</i>	Sea Spurge	RA	5
<i>Hornungia procumbens</i>	Oval Purse		0
<i>Limonium companyonis</i>	Sea-lavender	RA	7
<i>Lycium ferocissimum</i>	African Boxthorn	D, RA	8
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	RA	4
<i>Mesembryanthemum nodiflorum</i>	Slender Iceplant		2
<i>Nicotiana glauca</i>	Tree Tobacco		0
<i>Parapholis incurva</i>	Curly Ryegrass		1
<i>Reichardia tingitana</i>	False Sowthistle		3
<i>Rostraria pumila</i>	Tiny Bristle-grass		2
<i>Sonchus oleraceus</i>	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed  
 Blue = recorded in 2019, new since 2011

### Native flora

Species	Common Name	Aus status	SA status
<i>Acacia anceps</i>			
<i>Acacia anceps</i> (NC)	Angled Wattle		
<i>Acacia cupularis</i>	Cup Wattle		
<i>Acrotriche patula</i>	Prickly Ground-berry		
<i>Atriplex cinerea</i>	Coast Saltbush		
<i>Atriplex paludosa</i> ssp. <i>cordata</i>	Marsh Saltbush		
<i>Atriplex</i> sp.	Saltbush		
<i>Atriplex vesicaria</i>	Bladder Saltbush		
<i>Austrostipa acrociliata</i>	Graceful Spear-grass		
<i>Austrostipa elegantissima</i>	Feather Spear-grass		
<i>Austrostipa exilis</i>	Heath Spear-grass		
<i>Austrostipa flavescens</i>	Coast Spear-grass		
<i>Austrostipa nitida</i>	Balcarra Spear-grass		
<i>Austrostipa nullanulla</i>	Club Spear-grass		V
<i>Austrostipa</i> sp.	Spear-grass		
<i>Beyeria lechenaultii</i>	Pale Turpentine Bush		
<i>Billardiera cymosa</i> ssp. <i>cymosa</i>	Sweet Apple-berry		
<i>Brachyscome lineariloba</i>	Hard-head Daisy		
<i>Calandrinia eremaea</i>	Dryland Purslane		
<i>Calocephalus sonderi</i>	Pale Beauty-heads		R
<i>Calytrix tetragona</i>	Common Fringe-myrtle		
<i>Carpobrotus rossii</i> (NC)	Native Pigface		
<i>Cassytha peninsularis</i>	Peninsula Dodder-laurel		
<i>Chondropycxis halophila</i>	Salt Button-daisy		R

Cell descriptions – EP 80 Point Sinclair

Species	Common Name	Aus status	SA status
<i>Comesperma volubile</i>	Love Creeper		
<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop		
<i>Cratystylis conocephala</i>	Bluebush Daisy		
<i>Daucus glochidiatus</i>	Native Carrot		
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily		
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface		
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
<i>Eremophila deserti</i>	Turkey-bush		
<i>Eutaxia microphylla</i>	Common Eutaxia		
<i>Exocarpos aphyllus</i>	Leafless Cherry		
<i>Exocarpos syrticola</i>	Coast Cherry		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Frankenia pauciflora</i> var. <i>fruticulosa</i>	Southern Sea-heath		
<i>Frankenia sessilis</i>	Small-leaf Sea-heath		
<i>Geijera linearifolia</i>	Sheep Bush		
<i>Goodenia varia</i>	Sticky Goodenia		
<i>Haegiela tatei</i>	Small Nut-heads		R
<i>Helichrysum leucopsideum</i>	Satin Everlasting		
<i>Hydrocotyle callicarpa</i>	Tiny Pennywort		
<i>Hydrocotyle medicaginoides</i>	Medic Pennywort		
<i>Isotoma scapigera</i>	Salt Isotome		R
<i>Kippistia suaedifolia</i>	Fleshy Kippistia		
<i>Lawrenzia glomerata</i>	Clustered Lawrenzia		
<i>Lawrenzia squamata</i>	Thorny Lawrenzia		
<i>Leucophyta brownii</i>	Coast Cushion Bush		
<i>Lycium australe</i>	Australian Boxthorn		
<i>Maireana erioclada</i>	Rosy Bluebush		
<i>Maireana oppositifolia</i>	Salt Bluebush		
<i>Maireana pentatropis</i>	Erect Mallee Bluebush		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree		
<i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> (NC)	Dryland Tea-tree		
<i>Millotia major</i>			
<i>Myoporum insulare</i>	Common Boobialla		
<i>Nicotiana goodspeedii</i>	Small-flower Tobacco		
<i>Nitraria billardiieri</i>	Nitre-bush		
<i>Olearia axillaris</i>	Coast Daisy-bush		
<i>Olearia minor</i>	Heath Daisy-bush		
<i>Omphalolappula concava</i>	Burr Stickseed		
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Thyme Riceflower		
<i>Pittosporum angustifolium</i>	Native Apricot		
<i>Podotheca angustifolia</i>	Sticky Long-heads		
<i>Pterocladia rectangularis</i>			
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
<i>Samolus repens</i>	Creeping Brookweed		
<i>Santalum acuminatum</i>	Quandong		
<i>Scaevola crassifolia</i>	Cushion Fanflower		
<i>Sclerolaena diacantha</i>	Grey Bindyi		
<i>Sclerolaena uniflora</i>	Small-spine Bindyi		
<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel		



## Cell descriptions – EP 80 Point Sinclair

Species	Common Name	Aus status	SA status
<i>Senecio pinnatifolius</i> var. <i>maritimus</i>	Coast Groundsel		
<i>Senecio spanomerus</i>			
<i>Solanum hystrix</i>	Afghan Thistle		
<i>Solanum symonii</i>	Symon's Kangaroo-apple		
<i>Spinifex hirsutus</i>	Rolling Spinifex		
<i>Spinifex hirsutus</i> (NC)	Rolling Spinifex		
<i>Spyridium phlycooides</i>	Narrow-leaf Spyridium		
<i>Tecticornia halocnemoides</i> ssp. <i>halocnemoides</i>	Grey Samphire		
<i>Tecticornia</i> sp.	Samphire		
<i>Templetonia retusa</i>	Cockies Tongue		
<i>Tetragonia implexicoma</i>	Bower Spinach		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		
<i>Triodia</i> sp. (NC)	Spinifex		
<i>Westringia dampieri</i>	Shore Westringia		
<i>Westringia rigida</i>	Stiff Westringia		
<i>Wilsonia backhousei</i>	Narrow-leaf Wilsonia		
<i>Zygophyllum billardierei</i> (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

### Fauna

<b># of fauna in cell</b>	54 (53*) recorded – 51 (49*) birds, 0 (1*) reptile, 0 (0*) butterflies, 1 (0*) mammals, 0 (0*) amphibian (an additional 0 reptiles and 26 butterflies identified by experts as possibly occurring)
<b># of fauna surveys / records</b>	0 (0*) survey sites, 19 (23*) opportune sites
<b># of threatened fauna in cell</b>	13 (11*)
<b># of non-indigenous fauna</b>	1 (1*)

(#\*) Number of records present and analysed in 2011 study

Blue = total number of records present in 2019 review. NB: Additional records identified since the 2011 study have not undergone GIS Conservation and Threat analysis. Where additional data is considered significant, eg, significant Environmental weeds, Endangered species, Focal species, etc. recommendations will be made in the Action and Priority Table to re-run the GIS analysis.

### Non-indigenous fauna

Species	Common Name	Class	Record
<i>Sturnus vulgaris</i>	Common Starling	Aves	
<i>Pieris rapae rapae</i>	Cabbage White	Insecta	p

x: recorded, p: possibly there as suggested by R. Grund.

### Birds

Species	Common Name	Aus status	SA status
<i>Actitis hypoleucos</i>	Common Sandpiper		R
<i>Anas gracilis</i>	Grey Teal		
<i>Anthus australis</i>	Australian Pipit		
<i>Ardeotis australis</i>	Australian Bustard		V
<i>Arenaria interpres</i>	Ruddy Turnstone		R

Cell descriptions – EP 80 Point Sinclair

Species	Common Name	Aus status	SA status
<i>Artamus cinereus</i>	Black-faced Woodswallow		
<i>Biziura lobata</i>	Musk Duck		R
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		
<i>Calidris alba</i>	Sanderling		R
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	
<i>Calidris ruficollis</i>	Red-necked Stint		
<i>Calidris tenuirostris</i>	Great Knot	CR	R
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose		
<i>Charadrius novaehollandiae</i>			R
<i>Charadrius ruficapillus</i>	Red-capped Plover		
<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V
<i>Corvus coronoides</i>	Australian Raven		
<i>Corvus mellori</i>	Little Raven		
<i>Cygnus atratus</i>	Black Swan		
<i>Egretta novaehollandiae</i>	White-faced Heron		
<i>Eolophus roseicapilla</i>	Galah		
<i>Epthianura albifrons</i>	White-fronted Chat		
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel		
<i>Endiptyula minor</i>	Little Penguin		
<i>Falco cenchroides</i>	Nankeen Kestrel		
<i>Gavicalis virescens</i>	Singing Honeyeater		
<i>Gelochelidon nilotica</i>	Gull-billed Tern		
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		R
<i>Haematopus longirostris</i>	(Australian) Pied Oystercatcher		R
<i>Hirundo neoxena</i>	Welcome Swallow		
<i>Larus pacificus</i>	Pacific Gull		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairywren		
<i>Megalurus gramineus</i>	Little Grassbird		
<i>Microcarbo melanoleucos melanoleucos</i>	Little Pied Cormorant		
<i>Neophema petrophila</i>	Rock Parrot		R
<i>Pachyptila desolata</i>	Antarctic Prion		
<i>Pelecanus conspicillatus</i>	Australian Pelican		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
<i>Phalacrocorax varius</i>	Great Pied Cormorant		
<i>Phaps elegans</i>	Brush Bronzewing		
<i>Pluvialis squatarola</i>	Grey Plover		
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		
<i>Sericornis frontalis mellori</i>	White-browed Scrubwren (upper Gulf St-Vincent, YP, EP, South West)		
<i>Sternula nereis</i>	Fairy Tern	VU	E
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		
<i>Thalasseus bergii</i>	Greater Crested Tern		
<i>Tringa nebularia</i>	Common Greenshank		
<i>Tringa stagnatilis</i>	Marsh Sandpiper		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

Blue = recorded in 2019, new since 2011

## Butterflies

Species	Common Name	Status*	Record
<i>Trapezites sciron eremicola</i>	Sciron Rush-skipper	R	p
<i>Antipodia atralba</i>	Black and White Sedge-skipper	R	p
<i>Motasingba trimaculata trimaculata</i>	Dingy four-spot Sedge-skipper	LU	p
<i>Papilio demoleus stbenelus</i>	Chequered Swallowtail	Va	p
<i>Eurema (Terias) smilax</i>	Small Grass-yellow	Mi	p
<i>Belenois java teutonia</i>	Caper White	Mi	p
<i>Delias aganippe</i>	Wood White	R; Va	p
<i>Geitoneura klugii</i>	Common Xenica	LC	p
<i>Junonia villida calybe</i>	Meadow Argus	LC; Mi	p
<i>Vanessa itea</i>	Australian Admiral	LU; Mi	p
<i>Vanessa kershawi</i>	Australian Painted Lady	LC; Mi	p
<i>Danaus chrysippus petilia</i>	Lesser Wanderer		p
<i>Ogyris amaryllis meridionalis (coastal form)</i>	Amaryllis Azure		p
<i>Ogyris otanes</i>	Small Bronze Azure	E	p
<i>Jamenus icilus</i>	Icilius Hairstreak	R	p
<i>Candalides heathi heathi</i>	Rayed Blue	R	p
<i>Cyprotides cyprotus cyprotus</i>	Cyprotus Pencilled-blue	R	p
<i>Erina acasta</i>	Blotched Dusky-blue		p
<i>Erina hyacinthina form simplex</i>	Western Dusky-blue		p
<i>Lampides boeticus</i>	Long-tailed Pea-blue	LU	p
<i>Nacaduba biocellata biocellata</i>	Two-spotted Line-blue	LC	p
<i>Neolucia agricola agricola</i>	Fringed Heath-blue	LU	p
<i>Theclinessthes miskini miskini</i>	Wattle Blue	LU	p
<i>Theclinessthes serpentata serpentata</i>	Salt-bush Blue	LC	p
<i>Zizina labradus labradus</i>	Common Grass-blue	LC	p

Vulnerability as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon, x: recorded, p: possibly there as suggested by R. Grund.

## Mammals

Species	Common Name	Aus status	SA status
<i>Macropus fuliginosus</i>	Western Grey Kangaroo		

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered  
Blue = recorded in 2019, new since 2011

## Reptiles

No new reptile species recorded in 2019 data.

Species	Common Name	Aus status	SA status	Record
<i>Gehyra lazelli</i>	Southern Rock Dtella			

R: Rare, V: Vulnerable, E: Endangered C: Critically Endangered, x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

## Amphibians

No amphibian species records in 2011 or 2019.

## Appendix 1. Number of Flora and Fauna Survey Sites within each Coastal Cell - 2011

Coast Cell	Cell Name	Number of Flora Survey Sites	Number of Opportune Flora Sites	Number of Herbarium Record Sites	Number of Threatened Plant Population Flora Record Sites	Number of Reserve Database Flora Record Sites	Number of Fauna Survey Sites	Number of Opportune Fauna Sites	Number of Reserve Database Fauna Record Sites
EP1	Douglas Point	0	0	1	0	0	0	3	0
EP2	Port Bonython	7	1	3	0	0	0	10	0
EP3	False Bay	5	0	1	0	0	0	4	0
EP4	Whyalla	0	0	6	0	0	0	7	0
EP5	Eight Mile Creek	0	0	8	0	0	0	9	0
EP6	Murminnie Beach	0	0	6	0	0	0	1	0
EP7	Munyaroo CP	6	0	0	0	0	2	14	0
EP8	Munyaroo CR	2	0	4	0	0	0	1	0
EP9	Shoalwater Point	1	0	2	0	0	0	1	0
EP10	Franklin Harbor	15	1	23	0	0	1	41	0
EP11	Port Gibbon	3	0	3	0	0	0	5	0
EP12	Mills Beach	2	0	0	0	0	0	0	0
EP13	Red Banks	0	0	3	0	0	0	2	0
EP14	Arno Bay	6	8	6	2	0	0	6	0
EP15	Werrina	5	0	2	0	0	0	0	0
EP16	Dutton Bay	1	0	2	0	0	0	1	0
EP17	Port Neill	2	0	6	0	0	0	15	0
EP18	Cape Hardy	8	8	3	1	0	4	9	1
EP19	Oswald Trig	1	0	1	0	0	0	0	0
EP20	Tumby Bay	2	0	6	0	0	0	15	0
EP21	Cape Euler/ Tumby Island CP	36	0	10	1	0	1	4	1
EP22	Red Cliff	0	0	2	0	0	0	3	0
EP23	Ethla Wells	8	0	10	1	0	0	1	1
EP24	Whites River	2	0	6	0	0	0	3	0
EP25	Louth Bay/ Louth Island	0	0	4	0	0	0	11	0

EP26	Point Boston	1	0	0	4	0	0	0	0	0	0	6	0
EP27	Port Lincoln	0	0	0	13	0	0	0	0	0	0	30	0
EP28	Lincoln Cove Marina/ Grantham Island/ Tulka North	13	4	0	35	0	0	0	0	1	1	40	0
EP29	Cutting Grass Flat	3	0	0	48	0	0	0	0	0	0	23	0
EP30	Spalding Cove/ Cape Colbert	14	0	0	34	0	0	0	0	2	2	25	0
EP31	Cape Colbert to Cape Catastrophe	11	0	0	46	0	0	0	0	1	1	42	0
EP32	West Point/ Sleaford Bay	26	0	0	103	1	0	0	0	5	5	63	1
EP33	Fishery Bay	9	1	0	8	0	0	0	0	1	1	15	0
EP34	Whalers Way	7	0	0	10	0	0	0	0	2	2	42	0
EP35	Cathedral Rocks	0	0	0	1	0	0	0	0	0	0	40	0
EP36	Coffin Bay NP	11	0	0	62	1	0	0	0	1	1	49	0
EP37	Avoid Bay	8	0	0	46	0	0	0	0	3	3	38	1
EP38	Dead Man Corner	7	0	0	38	0	0	0	0	4	4	29	0
EP39	Point Whidbey/ Point Sir Isaac	10	1	0	88	0	0	0	0	2	2	43	0
EP40	Coffin Bay	7	0	0	18	1	1	1	1	2	2	39	1
EP41	Horse Peninsula	14	0	0	14	1	0	0	0	3	3	11	0
EP42	Fenchman Bluff	3	0	0	6	0	0	0	0	0	0	13	0
EP43	Convention Beach	7	0	0	3	0	0	0	0	1	1	9	0
EP44	Mount Drummond	7	0	0	3	0	0	0	0	0	0	2	0
EP45	Point Drummond	2	0	0	3	0	0	0	0	0	0	3	0
EP46	Kiana Cliffs	5	0	0	1	0	0	0	0	0	0	0	0
EP47	Hall Bay	2	0	0	3	0	0	0	0	1	1	13	0
EP48	Sheringa Beach	7	0	0	2	0	0	0	0	0	0	8	0
EP49	Loch Well Beach	3	0	0	2	0	0	0	0	2	2	6	0
EP50	Elliston	5	0	0	8	0	0	0	0	0	0	21	0
EP51	Lake Newland CR	3	0	0	0	0	0	0	0	0	0	5	0
EP52	Lake Newland CP	11	0	0	11	1	0	0	0	5	5	22	0
EP53	Talia Caves	7	0	0	3	1	0	0	0	0	0	8	0
EP54	Venus Bay	7	3	0	10	0	0	0	0	0	0	34	0
EP55	Venus Peninsula	29	0	0	11	0	0	0	0	13	13	70	0
EP56	Tyringa Beach	19	1	0	3	0	0	0	0	3	3	11	0

EP57	Baird Bay	8	1	5	0	0	1	12	0
EP58	Point Labatt	9	5	7	2	1	0	8	2
EP59	Calka Peninsula	6	0	2	0	0	0	7	0
EP60	Searcy Bay	3	0	5	0	0	0	3	0
EP61	Cape Blanche	4	0	8	0	0	0	7	0
EP62	Sceale Bay	9	5	8	1	0	0	23	0
EP63	Yanerbe Beach to The Granites	11	1	4	0	0	0	11	0
EP64	Corvisart Bay	4	1	6	0	0	0	5	0
EP65	Point Gibson	4	0	4	0	0	0	14	0
EP66	Streaky Bay	0	1	3	0	0	0	15	0
EP67	Eba Island/ Thomas Landing	17	0	5	0	0	2	11	1
EP68	Haslam	0	0	4	1	0	0	2	0
EP69	Acraman Creek	13	6	5	1	1	2	16	1
EP70	Point Brown	19	0	5	0	0	1	6	0
EP71	Cape Missiessy	4	0	1	0	0	0	4	0
EP72	Smoky Bay	3	0	1	0	0	0	10	0
EP73	Cape D'Estrees	10	0	15	2	0	0	21	2
EP74	Thevenard/ Ceduna	0	0	7	0	0	0	17	0
EP75	Murat Bay	1	0	1	0	0	0	3	0
EP76	Denial Bay	5	0	2	0	0	0	6	0
EP77	Tourville Bay	8	1	6	0	0	0	7	0
EP78	Bielamah Sandhills	12	1	1	0	0	0	1	0
EP79	Point Bell	6	0	1	0	0	1	13	0
EP80	Point Sinclair/ Congabie	7	1	15	0	0	0	23	0
EP81	Chadinga CR	7	0	5	0	0	2	3	0
EP82	Clare Bay	2	0	1	0	0	0	4	0
EP83	Fowlers Bay	12	2	18	2	0	1	9	1
EP84	Fowlers Bay CR	11	1	13	0	0	0	34	0
EP85	Cape Adieu	12	2	3	0	0	0	4	0

## Appendix 2. Number of Flora and Fauna Survey Sites within each Coastal Cell – 2019

Coast Cell	Cell Name	Number of Flora Survey Sites	Number of Opportune Flora Sites	Number of Herbarium Record Sites	Number of Threatened Plant Population Flora Record Sites	Number of Reserve Database Flora Record Sites	Number of Fauna Survey Sites	Number of Opportune Fauna Sites	Number of Reserve Database Fauna Record Sites
EP1	Douglas Point	1	13	17	0	0	0	9	0
EP3	False Bay	5	2	1	0	0	0	7	0
EP4	Whyalla	0	1	17			0	7	0
EP5	Eight Mile Creek	0	2	8			0	31	0
EP6	Murminnie Beach	0	0	5				1	0
EP7	Munyaroo CP	6	1	0			2	25	0
EP8	Munyaroo CR	2	3	2			2	4	0
EP11	Port Gibbon	2	1	10			0	13	0
EP12	Mills Beach	2	0	0			0	1	0
EP13	Red Banks	0	1	2			0	13	0
EP15	Werrina	2	0	2			0	1	0
EP16	Dutton Bay	2	1	1			0	5	0
EP17	Port Neill	1	1	14			0	21	0
EP18	Cape Hardy	4	6	5	1		3	28	0
EP19	Oswald Trig	1	0	1			0	15	0
EP22	Red Cliff	0	0	4			0	23	0
EP25	Louth Bay/ Louth Island	0	0	8			0	53	0
EP27	Port Lincoln	1	8	9			1	8	
EP35	Cathedral Rocks	0	2	1			0	21	0
EP44	Mount Drummond	3	3	3			0	16	0
EP45	Point Drummond	1	1	3			0	4	0
EP46	Kiana Cliffs	3	1	1			0	0	0
EP49	Loch Well Beach	2	0	2			5	9	0
EP66	Streaky Bay	1	3	4			0	56	0
EP67	Eba Island/ Thomas Landing	3	1	8			2	28	1
EP68	Haslam	1	1	6	1			5	
EP72	Smoky Bay	1	0	3			0	17	0
EP74	Thevenard/ Ceduna	1	0	45			0	24	0
EP80	Point Sinclair/ Congabie	3	2	17			0	19	0

## 5 Conservation and threat summary

This project has defined 85 coastal cells making up the Eyre Peninsula coast, and has assembled themes of conservation values and threatening processes. The data has been valued and the values placed on geographic information system (GIS) maps in detail, to the raster point level (25 × 25 m). This analysis has contributed to the cell descriptions detailed in section 6.3.

In addition, conservation values and threatening processes have been summed and averaged. Conservation values from all 32 conservation themes were summed and averaged for each cell and defined as ‘highest’, ‘medium’ or ‘lowest’ value according to breaks in the distribution of values (Figure 5.1). A similar process was used for the 19 threatening processes (Figure 5.2).

**Note:** The terms ‘highest’, ‘medium’ or ‘lowest’ for conservation value and threat total are comparative terms for the region only. They do not imply high or low value within the state or nationally. Thus a cell summarised as lowest value within the Eyre Peninsula coastal zone might, for example, be high value within the Southern Fleurieu region. However, the three categories allocated to cells, based on current available information, inform and prioritise management decisions and actions. Additional information can easily be added as it becomes available, and values and priorities may change in some areas.

### 5.1 Conservation and threat summary results

Figure 5.1 below shows the distribution of conservation priorities obtained by summarising the mean values of conservation layers for cells. If looked at broadly, the regional distribution of all cell conservation means values gives a clear contrast between the eastern Gulf coast (those cells facing E to SE and are north of Cape Catastrophe) and the western Southern Ocean coast (those cells facing South and South West, i.e. cells EP32 to EP85). The Gulf facing coast has 48% of the cells with mean conservation totals in the ‘lowest’ category; while the Southern Ocean coast has only 14.8% of cell means in this category. The Gulf coast has more cells with less remnant vegetation (29% of cells are more than half cleared), have many low scoring wetlands, and have slightly higher means for vegetation block degradation. The Ocean facing coast has only 15% of cells more than half cleared, has extensive high scoring dune areas, and has a great variety of habitats.

The distribution of summarised threat values (Figure 5.2) shows a similar distinction between the Gulf coast and the Southern Ocean coast. Sixty-eight percent of Gulf coast cells have a summarised threat value in the ‘highest’ category, while only 35% of Southern Ocean coast cells are in this category. Amongst the individual threat layers, Gulf Coast cells have 21 out of 31 cells with higher than median values for land use threat; in addition 24 out of 31 of these cells have higher than median scores for land ownership. Nineteen out of the 31 Gulf Coast cells have mean ORV totals higher than the median ORV cell mean score for the region. Some other comparisons between the Gulf coast, the Southern Ocean coast and the total study area are shown in Table 5.1.

Fifty- six of the 85 cells defined within the region (or 65.8%) were written up as detailed cell descriptions. Time and space in the final report, did not allow all cells to be detailed. The cells that have been written up in detail consisted of: all cells identified as having high conservation; all cells with medium conservation and high threat, and; all cells with medium conservation, a medium or low threat, which had a conservation value over 100.



**TABLE 5.1 Comparison of values, habitats and protection between the Gulf coast, Southern Ocean coast and total study area**

	Gulf coast	Southern Ocean coast	Total study area
Number of cells	31	54	85
Ave cell area	1,268.7 ha	2,859.7 ha	2,279.4 ha
Cells with highest conservation value	16%	40%	32%
Cells with medium conservation value	35%	44%	41%
Cells with lowest conservation value	48%	14%	27%
Cells with highest threat value	68%	35%	47%
Cells with medium threat value	19%	33%	28%
Cells with lowest threat value	13%	32%	25%
Area of remnant vegetation	74.7%	71%	71.8%
Area of salt marsh / mangrove	32.8%	7.2%	12.4%
Area of remnant vegetation that is salt marsh / mangrove	43.9%	10.1%	17.3%
Area of coastal sand dune	9.3%	37.5%	31.8%
Area of vegetated sand dune	8.9%	26.8%	23.2%
Area of unvegetated sand dunes	0.4%	10.7%	8.7%
Area protected within NP, CP, CR, WPA, HA or AqR	20.3%	48.5%	42.8%
Area of remnant vegetation that is protected within NP, CP, CR, WPA, HA or AqR	25.9%	52.8%	47.1%

If the mean cell values which make up the list of cells written up are examined as a spread sheet of individual conservation layers some patterns emerge. First, the cell values were ranked for each layer: thus, for example, layer 1B (rarity of plant associations) the highest mean cell value was 7.91, the lowest value was zero, and the middle ranking – median – was 6.00. Those layers with many high scores, as shown by a high median value, were identified as those factors which contributed most to cells accumulating a high score. These layers were: 1B, rarity of plant associations within the state; 2A, endemism of plant associations to the region (only or mainly found within the region); 6, habitat for significant butterfly species; 8A, viewshed analysis (% of the cell visible from the sea); 9A, vegetation patch size; 9B, vegetation patch connectivity; 9D, vegetation patch shape; 10A, indigenous heritage. At the other end of the scale, some layers had such low scores that they had little impact on the results. These were cells with their highest ranked scores below 2: 2B salt marsh endemism; 9C, the presence of very small vegetation patches; 10B, non-indigenous heritage; and 10C geological heritage. (It should be noted that these low scoring variables were also used in other regions, sometimes with stronger results, and although they do not contribute significantly to the overall scores, may be quite important locally). These considerations lead to some regional comments from the GIS analysis that underline and develop the comments in the flora chapter (section 3.1). Vegetation rarity and endemism within the state underline the uniqueness of these habitats, and the difference between the Eyre Peninsula region and the rest of South Australia.

The summarised conservation and threat values shown in Figures 5.1 and 5.2 can assist managers in prioritising areas and management actions at a regional scale. However, it should be noted that a cell with a ‘lowest’ or ‘medium’ summarised conservation value may contain areas within the

## Conservation and threat summary – Conservation and threat summary results

cell of high value which are significant for the region and under distinctive threat. Localities where this occurs are found within the detailed cell descriptions (for the cells that have been written up, section 6.3). Each of the detailed cell descriptions includes local management actions that were identified and prioritised during the analysis. The management actions for all the cells were then reviewed to develop regional management actions.

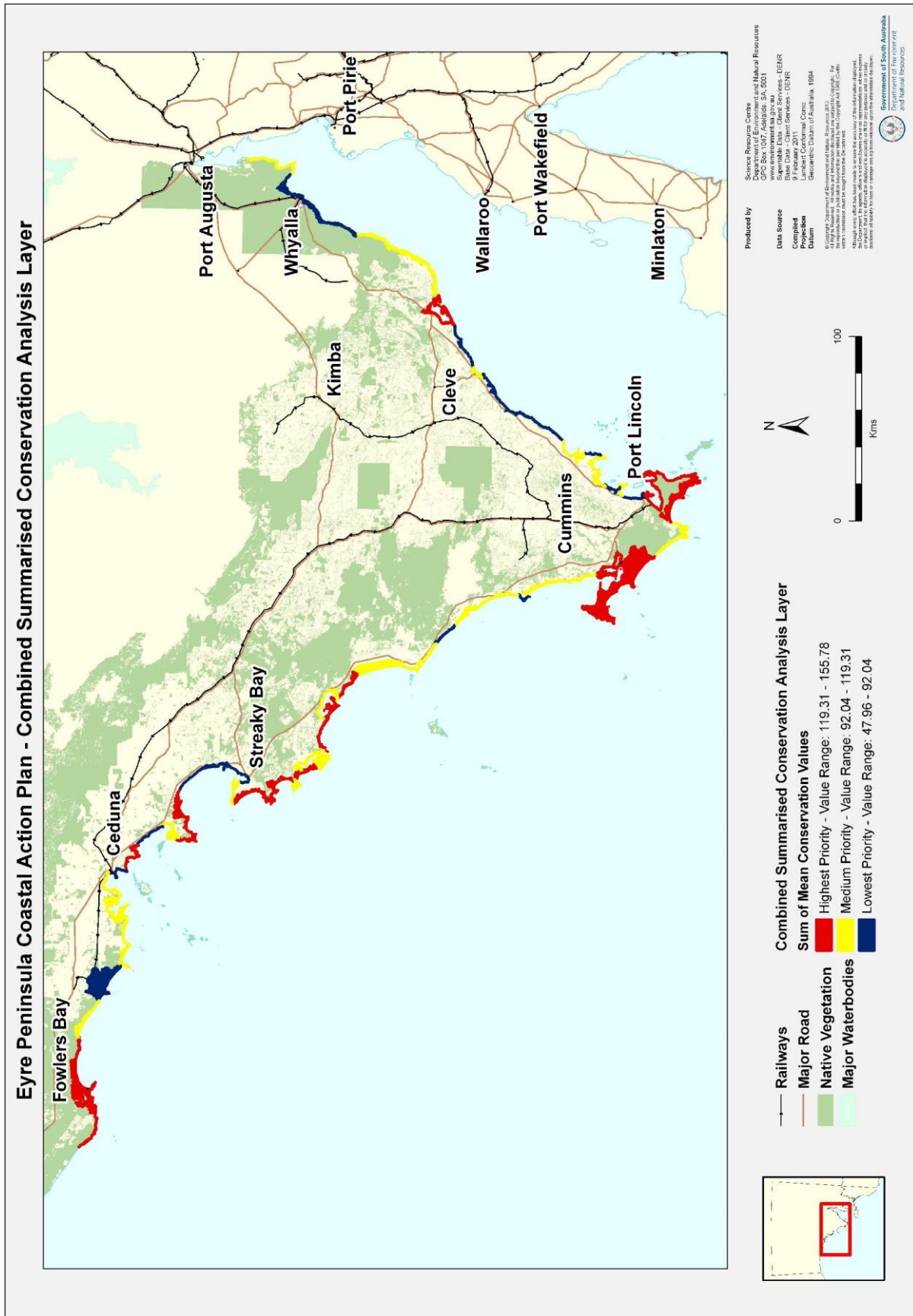


FIGURE 5.1 Combined conservation priority values by cell

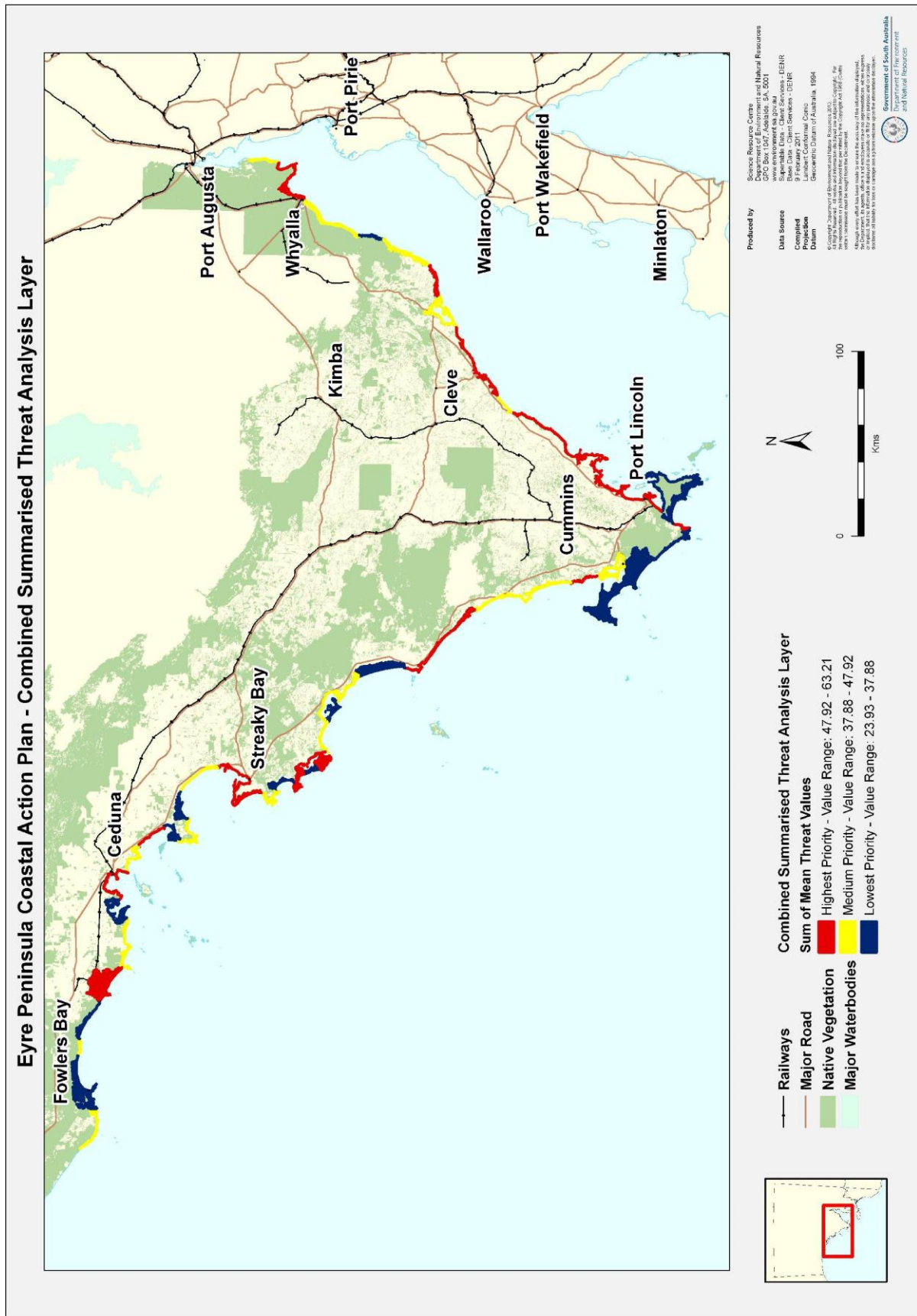


FIGURE 5.2 Combined threatening process values by cell

## 6 Cell descriptions

### 6.1 Constructing the cell descriptions

Following the 2019 review detailed description for all 85 cells have now been completed as part of this project. However, 56 of the cells were written up in detail as part of Volume One and 29 of the cells were written up as part of Volume Three. Volume Two consisted of: all cells identified as having high conservation; all cells with medium conservation and high threat, and; all cells with medium conservation, a medium or low threat, which had a conservation value over 100. Volume Three is a review of the 29 cells identified as having a conservation value below 100 to see if the conservation value may have elevated to a high conservation value from the initial study in 2011.

Construction of the detailed cell descriptions in Section 6.3 is shown in Table 6.1., below.

**TABLE 6.1** Cell description template

<b>Paragraph in coastal cell description</b>	<b>Source of information</b>
Landforms	The DEW internal GIS system – ‘Envmaps’. Reference materials.
Benthic Habitat	Envmaps
Biota	Floristic vegetation maps.
Land use/ land ownership	Envmaps
Uses	Field appraisals. Information from, and discussions with community members and government officers working on coastal projects in the area. Analysis of aerial and oblique photography. Current management plans.
Threats	
Opportunities	
Conservation analysis (GIS)	Analysis of state and museum databases, with supplementation by experts; ranking of conservation and threat data. Spatial summation and analysis by Science Information Branch, DEW.
Threats analysis (GIS)	
Climate change impacts	Analysis by the consultant of the IPCC (2007) and CSIRO (2008) projections for South Australia. Interpretation at a local scale of possible resulting changes in biophysical systems.
Actions	Derived from information above, including consultation with key players
Priority assigned to actions	Categorisation of priority was decided by the project team and other key players. Priority depended on (i) GIS Analysis; (ii) Key players within the locality; (iii) Potential hazard to life and property. This is further detailed below.
Biota	State and museum databases with supplementation from experts

### 6.2 Prioritising actions

In the cell descriptions (Section 6.3) a priority is assigned for each proposed action. The project team adopted a scheme of priority assessment based on the data, mapping and on-ground knowledge, having regard to the end users of the report and key players. This assessment is shown in Table 6.2., below.

## Cell descriptions – Prioritising actions

**TABLE 6.2**     **Criteria for prioritising proposed actions**

<b>Priority</b>	<b>Description</b>
High (cons/threat)	a matter or area that has a high conservation priority score in the region and is under very significant immediate threat
High (hazard)	an actual or potential flooding or erosion hazard, water quality or cliff instability issue for human safety
High (soc/econ)	an issue or place that has a high social or economic significance, where this arose from local consultation (this priority was not examined systematically)
Medium (cell)	an area or issue identified as being important in this cell
Medium (region)	an area or issue identified as being important in the region
Medium (threat)	a significant threat, within the GIS threat analysis, i.e. a threat to conservation values
Medium (cons)	an area or matter with high to medium total conservation priority scores in the region
Medium (soc/econ)	an area or matter of moderate social or economic significance
Low (cons)	an issue or place of low to moderate conservation priority and low to moderate threat
Low (hazard)	a flooding, erosion, water quality or cliff hazard of long term potential but low immediate concern

# Appendix 4 - Instructions for updating EP CAP with 2019 GIS data

## 1. Important Notes

- Data is stored on S Drive: [S:\DEHProjects\CMB Cstl Con Ass\EPCAP\2019 EPCAP Update - Nicole Pelton](#)
- Flora records from **prior to 2011** may have been added since the first EPCAP was completed, as old records are being added to BDBSA when verified
  - **For Flora ONLY:** If 2019 data differs from 2011 data, update to 2019 data and remove 2011 data.
- **Fauna records – keep all 2011 data**, as this data was collected from a variety of sources, and add any new fauna data from 2019 GIS lists.
- GIS Supertable Source Codes:
  - SU = survey
  - AL = ALIS database \*\*count these as Surveys
  - RV = Roadside Vegetation Surveys \*\*count these as Surveys
  - OP = Opportunistic
  - AD = Herbarium
- If no species are recorded, delete the Table and write 'No species recorded'.
- Highlight new records in red text.

## 2. Fill in Weeds Table

- Go to [Cell folder](#).
- See Excel Spreadsheet titled 'Cell EPX Fauna Flora summary SL ddmmyy'.
  - Column B 'N' = Non-indigenous - copy Column C (Weed Species) and G (Common Name) into table.
- To fill in Status and Study Rating columns, See Excel Spreadsheet '[USE THIS - Cell Description Data](#)': Go to Sheet titled 'Weed list', see Columns E and F.
- Double check Declared Weed status hasn't changed in the latest '[Declaration of Animals and Plants 2017](#)' document.
- Compare to 2011 data – highlight new records in red text.

### Weeds

Species	Common Name	Status	Study rating
		Red	0-9
		Alert? (if Study Rating is ≥4)	See Table 4.2, pp. 191-195 in
		<a href="#">Declared Weed?</a>	<a href="#">Volume 1</a>
		(Check latest doc in case changed since 2011?)	<a href="#">EPCAP 2011</a>

D: Declared weed, RA: Red alert weed

## 3. Fill in Native Flora Table

- Go to [Cell folder](#).
- See Excel Spreadsheet titled 'Cell EPX Fauna Flora summary SL ddmmyy'.



- Column B ‘Y’ = Indigenous – copy Column C (Native Species), G (Common Name), J (EPBC Listing) and K (NPWSA Listing) into table.
- Compare to 2011 data – highlight new records in red text.

## Native flora

Species	Common Name	Aus status	SA status
<i>Species</i>	Common Name	EPBC Listing	NPWSA Listing

R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

## 4. Complete Summary Flora Table

<b>Remnant vegetation area (ha)</b>	See Excel Spreadsheet <a href="#">‘USE THIS - Cell Description Data’</a> Go to Sheet titled ‘Cell Stats’, see Column I and J
<b># flora surveys/records</b>	See Excel Spreadsheet <a href="#">‘USE THIS - Cell Description Data’</a> Go to Sheet titled ‘Flora Fauna Site Records’, fill in Columns K-O based on <a href="#">‘2019 GIS Data’</a> for the Cell. Insert #s: X flora surveys, X opportune sites, X Herbarium records
<b># flora in cell</b>	Insert sum of number of Non-Indigenous PLUS Native species
<b># conservation rated flora in cell</b>	Insert number of Cwlth or State rated native species
<b># non-indigenous flora in cell</b>	Insert number of weed species
<b>Significant CDCS floristic community</b>	See Excel Spreadsheet <a href="#">‘USE THIS - Cell Description Data’</a> Go to Sheet titled ‘Floristic Coastal Dune and Cliff’, see Columns A, B, C and F – if Cell # is listed, add ‘Structural Class’, ‘Floristic Community’ and ‘% in EP’ data here
<b>Protected area</b>	See Excel Spreadsheet <a href="#">‘USE THIS - Cell Description Data’</a> Go to Sheet titled ‘Cell Stats’, see Column AV: insert % of remnant vegetation protected

## 5. Prepare GIS Fauna Data

- Go to [Cell folder](#).
- See Excel Spreadsheet titled ‘Cell EPX Fauna Flora summary SL ddmmyy’.
- Open Worksheet ‘EPX Fauna Summary’
- Sort by:
  - a. Column I ‘CLASSNAME’
  - b. Column D ‘ISINDIGENO’ – N first, then Y
- Follow steps 5-10 below using data from this spreadsheet.

## 6. Fill in Non-Indigenous Fauna Table

- Copy Column E (Species), K (Common Name), and I (Class Name) into table.
- Place ‘x’ in record column, unless it is the Cabbage Moth which may be ‘p’ for possibly there as suggested by R. Grund.
- Compare to 2011 data – highlight new records in red text.

## Non-indigenous fauna

Species	Common Name	Class	Record
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x: recorded, p: possibly there as suggested by R. Grund.

## 7. Fill in Birds Table

- For CLASS NAME ‘AVES’:
  - Copy Column E (Species), K (Common Name), L (EPBC Listing) and M (NPWSA Listing) into table.
- Compare to 2011 data – highlight new records in red text.

### Birds

Species	Common Name	Aus status	SA status
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R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

## 8. Fill in Mammals Table

- For CLASS NAME ‘MAMMALIA’:
  - Copy Column E (Species), K (Common Name), L (EPBC Listing) and M (NPWSA Listing) into table.
- Compare to 2011 data – highlight new records in red text.

### Mammals

Species	Common Name	Aus status	SA status
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R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

## 9. Fill in Reptiles Table

- For CLASS NAME ‘REPTILIA’:
  - Copy Column E (Species), K (Common Name), L (EPBC Listing) and M (NPWSA Listing) into table.
  - Insert ‘x’ in record column.
- Then go to 2011 Fauna data Excel spreadsheet titled ‘EPX FAUNA’
  - Go to Reptiles and Amphibians sheet.
  - From REPTILES Section, Copy Column C (Species), D (Common Name), E (EPBC Listing), F (NPWSA Listing) and G (record type: e, c, or x) into table.
  - Delete any double-ups of same species. If one record has ‘e’ or ‘c’ but species appears in the 2019 GIS data list, ensure the record column shows ‘x’.
- Compare to 2011 data – highlight new records in red text.

### Reptiles

Species	Common Name	Aus status	SA status	Record
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R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm).

## 10. Fill in Amphibians Table

- For CLASS NAME ‘AMPHIBIA’:
  - Copy Column E (Species), K (Common Name), L (EPBC Listing) and M (NPWSA Listing) into table.
  - Insert ‘x’ in record column.
- Then go to 2011 Fauna data Excel spreadsheet titled ‘EPX FAUNA’
  - Go to Reptiles and Amphibians sheet.
  - From AMPHIBIANS Section, Copy Column C (Species), D (Common Name), E (EPBC Listing), F (NPWSA Listing) and G (record type: e, c, or x) into table.
  - Delete any double-ups of same species.
    - If one record has ‘e’ or ‘c’ but species appears in the 2019 GIS data list, ensure the record column shows ‘x’.
- Compare to 2011 data – highlight new records in red text.

### Amphibians

Species	Common Name	Aus status	SA status
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R: Rare, V: Vulnerable, E: Endangered, C: Critically Endangered

## 11. Fill in Butterflies Table

- Go to 2011 Fauna data Excel spreadsheet titled ‘EPX FAUNA’
  - Go to Butterflies worksheet.
  - Sort by indigenous status – separate out non-indigenous species and insert into Non-Indigenous Table above.
  - For Indigenous species, copy Column B (Species), C (Common Name), D (Status), and E (Record type) into table.
  - Ensure Status abbreviations are used (i.e. Mi, Va, LC, LU, R).
  - Delete any double-ups of same species.
    - If one record has ‘p’ but species appears in the 2019 GIS data list, ensure the record column shows ‘x’.
- Compare to 2011 data – highlight new records in red text.

### Butterflies

Species	Common Name	Status*	Record
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Vulnerability as per R. Grund. E: Endangered, V: Vulnerable, R: Rare, C: Critically Endangered, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommon  
 x: recorded, p: possibly there as suggested by R. Grund.

## 12. Complete Summary Fauna Table

### Fauna

<b># of fauna in cell</b>	Total number of native and feral species recorded (sum of all fauna RECORDS) - Number of records of each Class (reptiles and butterflies: number of species with e, c or p)
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	X recorded – X birds, X butterflies, X mammals, X reptiles, X amphibians (an additional X reptiles and X butterflies identified by experts as possibly occurring)
<b># of fauna surveys/records</b>	See Excel Spreadsheet <a href="#">‘USE THIS - Cell Description Data’</a> Go to Sheet titled ‘Flora Fauna Site Records’, fill in Columns P-O based on <a href="#">‘2019 GIS Data’</a> for the Cell. Insert #s: X surveys, X opportune sites
<b># of threatened fauna in cell</b>	Insert number of Cwlth or State rated native species: X
<b># of non-indigenous fauna</b>	Insert number of feral species: X

### 13. Update Biota paragraph

On the first page of the Cell Description under the Heading *Biota*, summarise the 2019 flora and fauna data to reflect number of flora/fauna records detailed in the Biota tables at the end of the document.

### 14. Update Conservation and Threat Analysis paragraphs

Under the Headings *Conservation Analysis (GIS)* and *Threat Analysis (GIS)*, insert a sentence or two to reflect any important new flora/fauna data that may impact Cell scores – if significant, add an Action to the Recommended Actions and Priority Table to recommend running GIS analysis again. If the new Biota data is insignificant, make a note that the new data would be unlikely to affect the scores (or to similar effect).

- New record – consider:
  - Threatened or pest species?
  - Focal species?